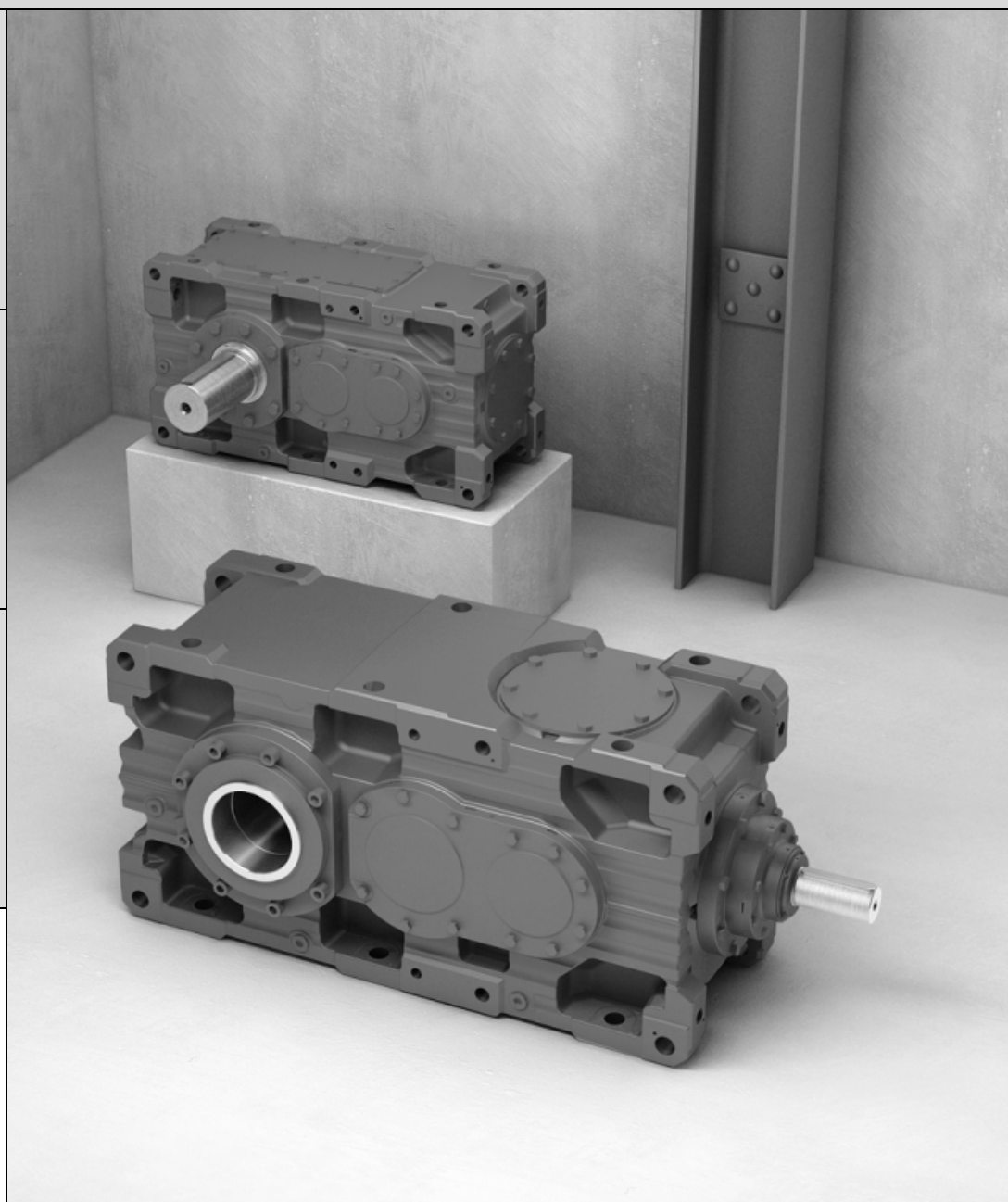
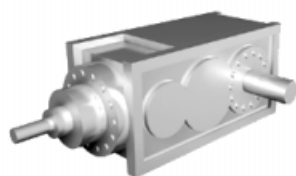
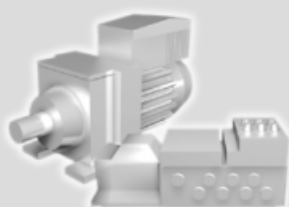
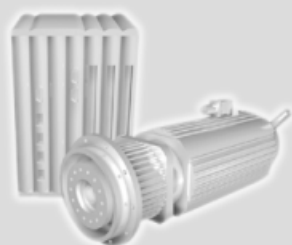
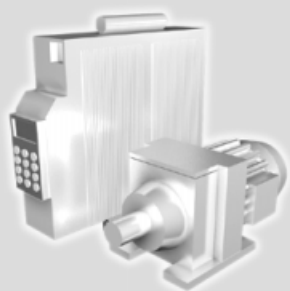




SEW
EURODRIVE



Industrial Gear Units: Helical and Bevel-Helical Gear Units X.. Series Horizontal Gear Units

Edition 05/2007

11513411 / EN

Operating Instructions





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1 Important Information about the Operating Instructions

1.1 Important notes and proper use

1.1.1 Introduction

Adhering to the operating instructions is a prerequisite for fault-free operation and the fulfillment of any right to claim under warranty. Read the operating instructions before you start working with the unit.

Make sure that the operating instructions are available to persons responsible for the plant and its operation, as well as to persons who work independently on the unit.

Also observe other technical documents, delivery contracts or other agreements.

1.1.2 Proper use

Proper use refers to the procedure specified in the operating instructions.

X series industrial gear units are gear units driven by motors for industrial and commercial systems. The units may only be run at the speeds and powers shown in the technical data or on the nameplate. Implementing gear unit loads other than the permitted values or operating the gear units in areas of application other than industrial and commercial systems is only permitted after consultation with SEW-EURODRIVE.

For the purpose of EC Machinery Directive 98/37/EC, X series industrial gear units are components for installation in machinery and systems. In the scope of the EC directive, you must not take the machinery into operation in the proper fashion until you have established that the end product complies with Machinery Directive 98/37/EC.

1.1.3 Qualified personnel

Gear units represent a potential hazard for persons and material assets. Consequently, assembly, installation, startup and service work may only be performed by trained personnel who are aware of the potential hazards.

The personnel must be appropriately qualified for the task at hand and must be familiar with the

- Mounting
- Installation
- Startup
- Operation

of the product.

The personnel must carefully read, understand and comply with the operating instructions, in particular the safety notes section.



Important Information about the Operating Instructions

Important notes and proper use

1.1.4 Exclusion of liability

You must comply with the information contained in these operating instructions to ensure safe operation of the X series gear units and to achieve the specified product characteristics and performance requirements.

SEW-EURODRIVE GmbH & Co KG assumes no liability for injury to persons or damage to equipment or property resulting from non-observance of these operating instructions. In such cases, any liability for defects is excluded.

1.1.5 Product names and trademarks

The brands and product names in these operating instructions are trademarks or registered trademarks of the titleholders.

1.1.6 Disposal

- Housing parts, gears, shafts and roller bearings of the gear units must be disposed of as steel scrap. This also applies to gray-cast iron parts if there is no separate collection.
- Collect waste oil and dispose of it according to the regulations in force.



1.2 Explanation of symbols

The operating instructions contain important information that deals with general and operational safety. This information is emphasized in particular with the following symbols:



Hazard

Possible consequences: Severe or fatal injuries.



Electrical hazard

Possible consequences: Severe or fatal injuries.



Hazardous situation

Possible consequences: Slight or minor injuries.



Danger of burns

Touching the gear unit when it has not yet cooled off may result in burns.



Harmful situation

Possible consequences: Damage to the drive and the environment.



Tips and useful information.

1.3 Operating notes



- The gear unit is delivered without oil fill.
- The nameplate of the gear unit contains the most important technical data.
- The gear unit may only be installed and operated within the conditions specified in the service and delivery contract.
- The mounting position may only be changed after consultation with SEW-EURODRIVE. The warranty will become void without prior consultation.



2 Safety Notes

2.1 Preliminary remark



- The following safety notes relate primarily to the use of X series industrial gear units.
- If using motors, please also refer to the safety notes for motors in the corresponding operating instructions.
- Unauthorized changes to the gear unit that impair operational safety are not permitted. This also applies to protection devices that are installed as touch guards.
- Also consider the supplementary safety notes in the individual sections of these operating instructions.

2.2 General information



Electrical connection

The electrical connection may only be established by a qualified electrician. General as well as local regulations should be followed, especially in regard to the protective measures. Connections should be made according to the included circuit diagram and/or the wiring diagram in the terminal box.



Danger of burns

Touching the gear unit when it has not yet cooled off may result in burns.

Never touch the gear unit during operation or during the cool down phase after it has been switched off.



Never install or start up damaged products.

In the event of damage, submit a complaint to the shipping company immediately.

During and after operation, industrial gear units, primary gear units, and motors have:

- Live parts
- Moving parts
- Hot surfaces

Only qualified personnel may carry out the following work:

- Installation and assembly
- Connection
- Startup
- Maintenance
- Servicing



The following information and documents must be observed during these processes:

- Relevant operating instructions and wiring diagrams
- System-specific regulations and requirements
- National/regional safety and accident prevention regulations



Serious injuries and property damage may result from:

- Improper use
- Incorrect installation or operation
- Improper removal of the required protective covers

2.2.1 Startup/operation



- **Check that the direction of rotation is correct in decoupled condition. Pay attention to unusual grinding noises as the shaft rotates.**
- Secure the keys without output elements for the test run.
- Do not deactivate monitoring and protection equipment during the test run.
- When in doubt, switch off the main motor whenever changes in relation to normal operation occur (such as increased temperatures, noise, oscillation). Determine the cause of the fault and consult SEW-EURODRIVE.
- Work carefully and keep safety in mind.
- Work on the gear unit and additional equipment only when the machine is not in use. Prevent the drive unit from being accidentally switched on by locking the keyswitch or removing the fuses from the power supply. Attach an information sign near the ON switch to warn that the gear unit is being worked on.
- Observe the notes attached to the gear unit, such as the nameplate and direction arrow. They must be free of paint and dirt. Replace missing signs.
- When installing the gear unit in devices or systems, the manufacturers of the device or system are obliged to include the regulations, notes, and descriptions from these operating instructions in their own operating instructions.
- Purchase spare parts from SEW-EURODRIVE.

2.2.2 Operating environment



- **In its normal form, the gear unit is not suited for operation in potentially explosive atmospheres.**
- **Follow the specifications regarding contract-specific ambient temperature ratings and ambient conditions. Modifications require prior approval by SEW-EURODRIVE.**



Safety Notes

Symbols on the gear unit

2.3 Symbols on the gear unit

The symbols on the gear unit must be observed. They have the following meaning:

Symbol	Meaning
	Oil fill plug
	Oil drain
	Oil level glass
	Oil dipstick
	Inspection opening
	Breather plug
	Air outlet screw
	Water inflow
	Water return
	Direction of rotation
	Delivery state
	Hot surfaces
 GEAR UNIT IS VPI ANTI-RUST TREATED. COVER AND PLUG OF GEAR UNIT MUST NOT TO BE OPENED AND GEAR UNIT MUST NOT ROTATED BEFORE START-UP. BEFORE START-UP THE PROTECTIVE PLUG MUST BE REMOVED AND REPLACED BY ENCLOSED AIR VALVE.	Extended storage

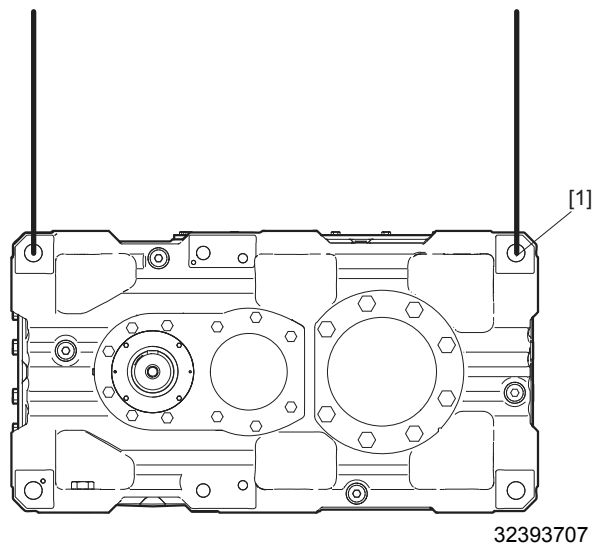


2.4 Transportation

2.4.1 Notes

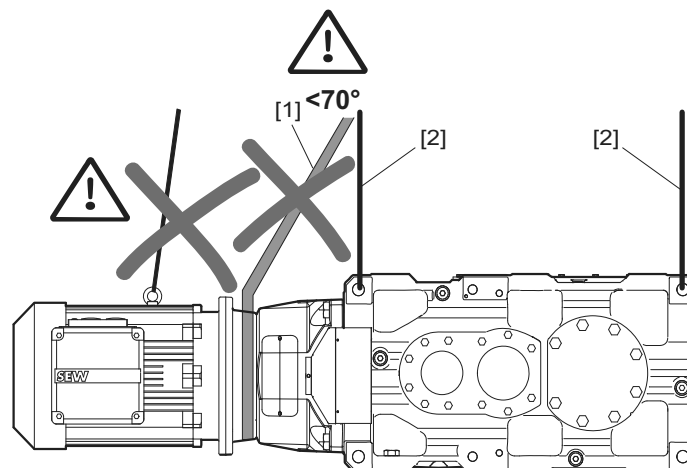
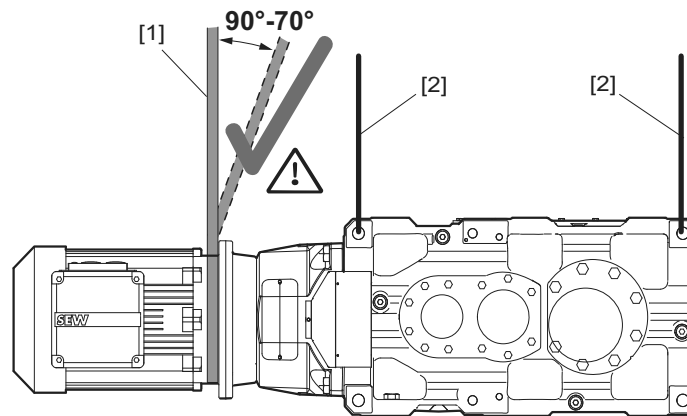


- Immediately upon delivery, inspect the shipment for any damage that may have occurred during transportation. Inform the shipping company immediately. It may be necessary to preclude startup.
- The weight of the gear unit is indicated on the nameplate or the dimension sheet. Observe the loads and specifications given on the nameplate.
- Use suitable, sufficiently rated handling equipment if necessary.
- Remove restraining devices used for transportation prior to startup.
- The gear unit must be transported in a manner that prevents injuries and damage to the gear unit. For example, impacts against exposed shaft ends can damage the gear unit.
- Stay away from beneath the gear unit during transport.
- Secure the danger zone.
- For transport, gear units are suspended from the points indicated in the following drawings.
- When transporting the gear unit, it may only be hoisted using the four transport holes [1].



**2.4.2 Gear units with motor adapters**

Gear units with motor adapters may only be transported using lifting cables/chains [2] or lifting straps [1] at an angle from 90° (vertical) up to 70° from the horizontal. The eyebolts on the motor may not be used for transport.

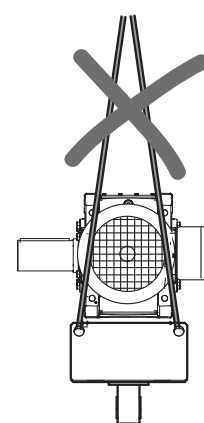
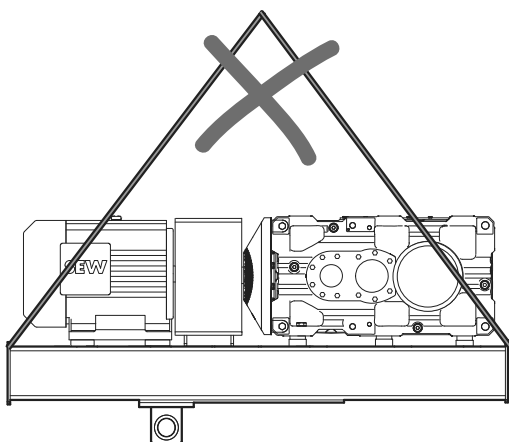
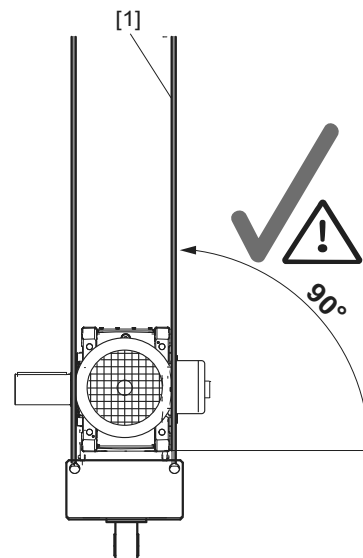
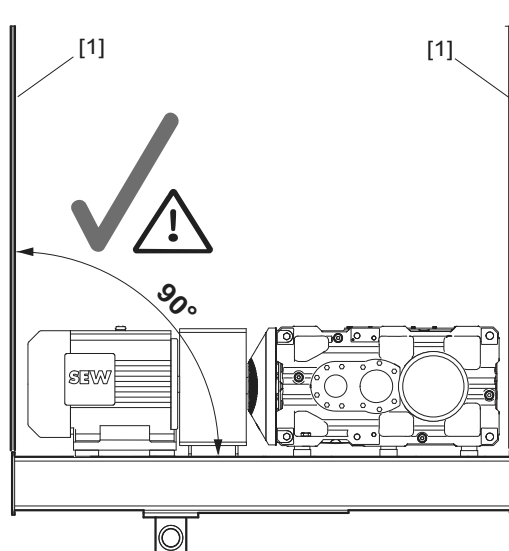


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2.4.3 Gear units on swing base/base plate

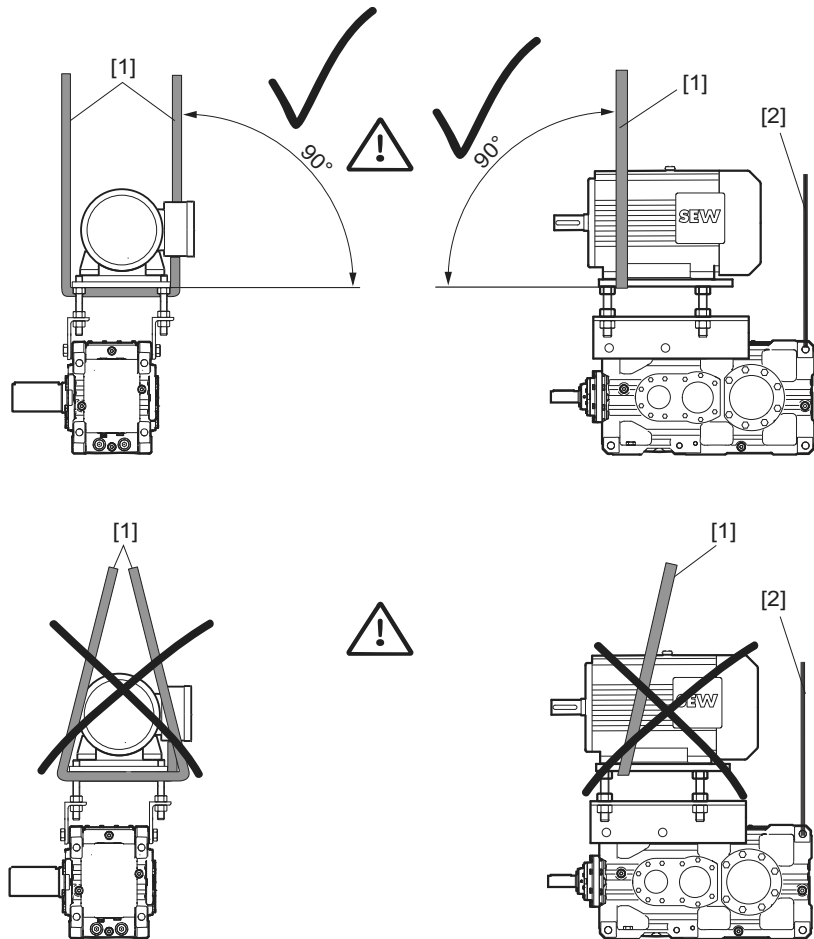
Gear units on a swing base/base plate may only be transported using vertically tensioned lifting cables [1] or chains.



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**2.4.4 Gear units with V-belt drive**

Gear units with a V-belt drive must only be transported using lifting straps [1] and cables [2] at an angle of 90° (vertical). The eyebolts on the motor may not be used for transport.



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2.5 Coating and surface protection systems

SEW version	OS 1 Low environmental impact	OS 2 Medium environmental impact	OS 3 High environmental impact
Use as surface protection with typical ambient conditions Corrosion categories DIN EN ISO 12944-2	Unheated buildings where condensation can build up. Atmospheres with low contamination levels, mostly rural areas.	Production spaces with high humidity levels and medium air contamination. City and industrial atmospheres, medium contamination with sulfur dioxide (NPP, dairies).	Chemical processing plants, swimming pools, boat houses above sea water. Industrial areas and coastal areas with moderate salt load.
	C2 (low)	C3 (moderate)	C4 (high)
Condensation test ISO 6270	120 h	120 h	240 h
Salt spray test ISO 7253	–	240 h	480 h
NDFT on concrete base¹⁾	150 µm (0.00591 in)	210 µm (0.00827 in)	270 µm (0.0106 in)
Color top coat²⁾	RAL 7031	RAL 7031	RAL 7031
Color according to RAL	Yes	Yes	Yes
Uncoated parts: shaft end/flange	Coat with hand perspiration and water repellent anticorrosion agent for external preservation		

1) NDFT (nominal dry film thickness) = standard layer thickness; minimum layer thickness = 80% NDFT; maximum layer thickness = 3x NDFT (DIN EN ISO 12944-5)

2) Standard color

2.6 Storage and transport conditions

2.6.1 Interior corrosion protection

Standard protection After the test run, the test oil fill is drained out of the gear unit. The remaining oil film protects the gear unit against corrosion for a limited period of time.

Long-term protection After the test run, the test oil fill is drained out of the gear unit and the interior space is filled with a vapor phase inhibitor. The breather is replaced by a screw plug and enclosed with the gear unit.



Safety Notes

Storage and transport conditions

2.6.2 Exterior corrosion protection:



- Bare, uncoated parts are coated with an anti-rust agent. Remove it only using an appropriate solvent which is not harmful to the oil seal.
- Sealing surfaces on radial oil seals are protected by an appropriate anti-corrosion agent.
- When the gear unit is filled with vapor phase inhibitor, the breather filter is replaced by a screw plug and enclosed with the gear unit. The enclosed breather filter must be installed on the gear unit again before startup.
- Small spare parts and loose pieces, such as bolts, nuts, etc., are packed in corrosion protection plastic bags (VCI corrosion protection bags).
- Threaded holes are covered by plastic plugs.
- **If the gear unit is stored longer than six months, you must check the protective coating of unpainted areas as well as the paint coating regularly. Areas where the protective coating or paint has been damaged may have to be recoated, as needed.**
- **The output shaft must be rotated at least one full rotation so that the position of the roller elements in the bearings of the drive and output shafts changes. This procedure must be repeated every six months until startup.**

2.6.3 Packaging

Standard packaging

The gear unit is delivered on a pallet without cover.

Application: Land transport

Long-term packaging

The gear unit is attached to a pallet, wrapped in film and equipped with appropriate corrosion protection material in the film packaging.

Application: Land transport and for long-term storage

Seaworthy packaging

The gear unit is packaged in a seaworthy wooden box and is delivered on a pallet that is appropriate for sea transport. The gear unit is wrapped in a film and equipped with appropriate corrosion protection material in the film packaging.

Application: Sea transport and for long-term storage



2.6.4 Storage conditions

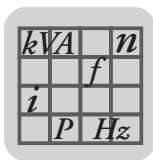


During storage, up to startup, the gear unit must be stored in a shock-free manner in order to prevent damage to the anti-friction bearing races.



The gear units are delivered without an oil fill; different protection systems are required depending on storage period and storage conditions.

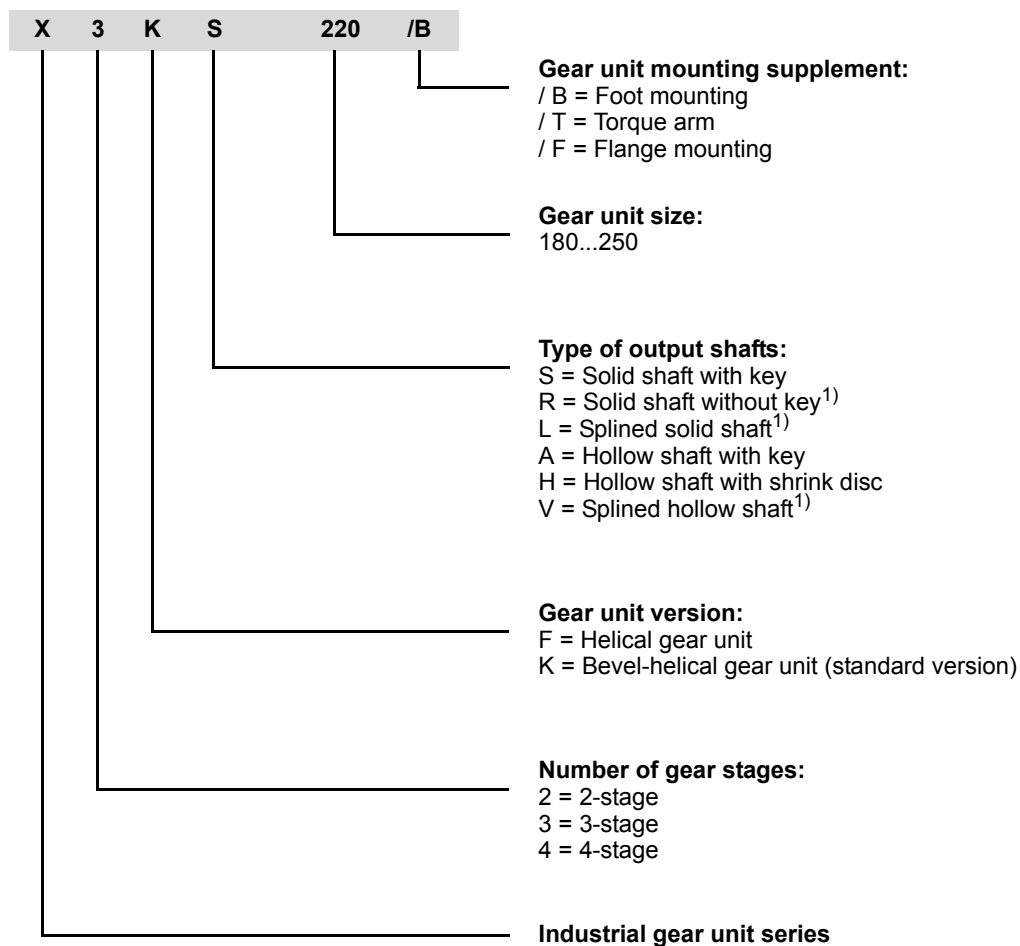
Climate zone	Packaging + corrosion protection	Storage location	Storage duration
Temperate (Europe, USA, Canada, China and Russia, excluding tropical zones)	Long-term packaging + Long-term corrosion protection	Roofed, protected against rain and snow, no shock loads.	Up to three years with regular checks of the packaging and moisture indicator (Relative humidity < 50%).
	Standard packaging + Standard corrosion protection	Under roof, enclosed at constant temperature and atmospheric humidity (5 °C < ϑ < 60 °C [41 °F < ϑ < 140 °F], relative humidity < 50%). Protected against sudden temperature fluctuations and with controlled ventilation with filter (free from dust and dirt). Protected against aggressive vapors and shocks.	One year or more with regular inspections. Check for clean- liness and mechanical damage during inspection. Check corrosion protection.
Tropical (Asia, Africa, Central and South America, Australia, New Zealand excluding temperate zones)	Long-term packaging + Long-term corrosion protection Protected against insect damage and mildew by chemical treatment.	Under roof, protected from rain and shocks	Up to three years with regular checks of the packaging and moisture indicator (Relative humidity < 50%).
	Standard packaging + Standard corrosion protection	Under roof, enclosed at constant temperature and atmospheric humidity (5 °C < ϑ < 60 °C [41 °F < ϑ < 140 °F], relative humidity < 50%). Protected against sudden temperature fluctuations and with controlled ventilation with filter (free from dust and dirt). Protected against aggressive vapors and shocks. Protected against insect damage.	One year or more with regular inspections. Check for clean- liness and mechanical damage during inspection. Check corrosion protection.



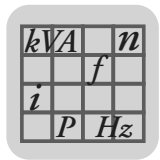
3 Design of Basic Gear Units

3.1 Unit designation

3.1.1 Example



1) Upon request to SEW-EURODRIVE



3.2 Nameplate

3.2.1 Example

○ **SEW-EURODRIVE** Bruchsal / Germany ○

Type

Nr. 1

	norm.	min.	max.	i	1 :	
PK1 [kW]	180	36	180	FS		39,06
MK2 [Nm]	4300	4300	4300	FR1 [N]		1,5
n1 [1/min]	1480	296	1480	FR2 [N]		0
n2 [1/min]	37.9	7.6	37.9	FA1 [N]		0
Operation instruction have to be observed!				FA2 [N]		0
Made in Germany				Mass [kg]		1340

Qty of greasing points Fans IM:M1-F1

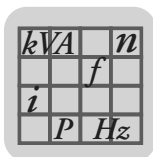
Year

○ ○

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Type		Unit designation
Nr. 1		Serial number
P _{K1}	[kW]	Operating power on the input shaft (HSS)
M _{K2}	[Nm]	Gear unit output torque
n ₁	[1/min]	Input speed (HSS)
n ₂	[1/min]	Output speed (LSS)
norm.		Standard operating point
min.		Operating point at minimum speed
max		Operating point at maximum speed
i		Exact gear unit reduction ratio
F _S		Service factor
F _{R1}	[N]	Actual overhung load acting on the input shaft
F _{R2}	[N]	Actual overhung load acting on the output shaft
F _{A1}	[N]	Actual axial load acting on the input shaft
F _{A2}	[N]	Actual axial load acting on the output shaft
Mass	[kg]	Weight of the gear unit
Qty of greasing points		Number of points for regreasing
Fans		Number of installed fans
		Oil grade and viscosity class / oil quantity
Year		Year of construction
IM		Mounting position and mounting surface



3.3 Mounting position

The mounting position defines the position of the gear unit housing in the space and is designated M1....M6.

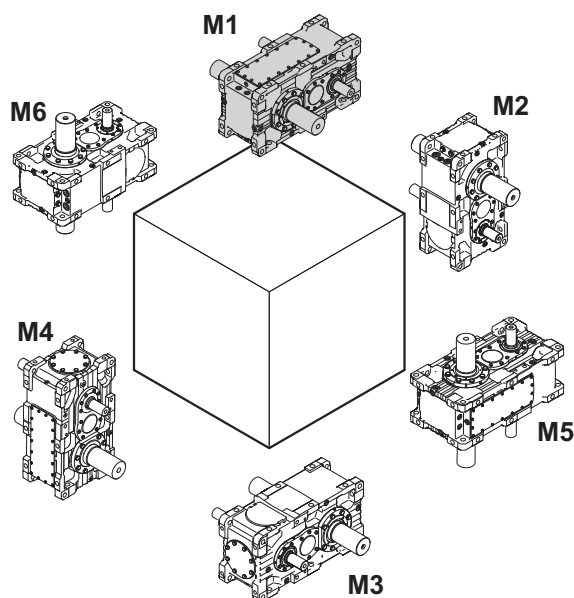


The horizontal gear units described in these operating instructions normally have mounting position M1 unless otherwise indicated.

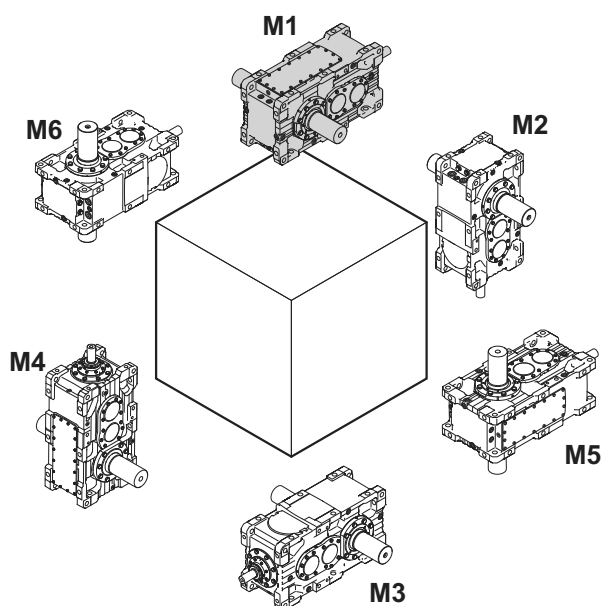
It is also possible to mount horizontal gear units in position M3. However, when this mounting position is used, the use of certain optional equipment may be limited. Contact SEW-EURODRIVE in this case

For vertical gear units, the standard mounting position is M5, for upright gear units M4. These will be described in a separate publication.

X.F



X.K



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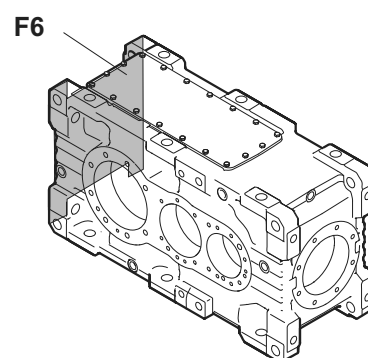
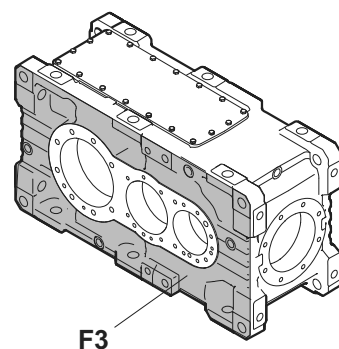
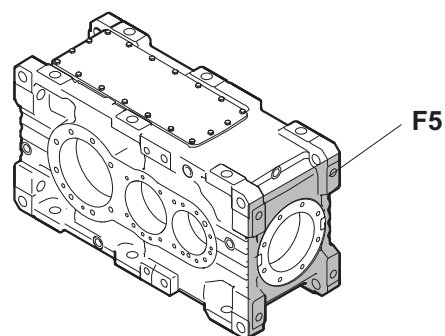
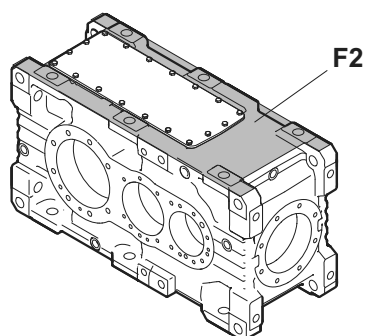
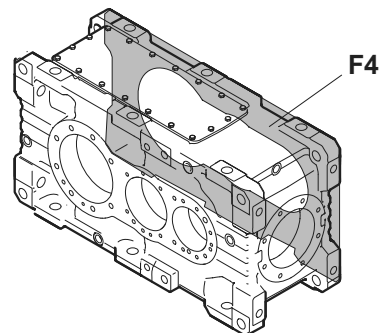
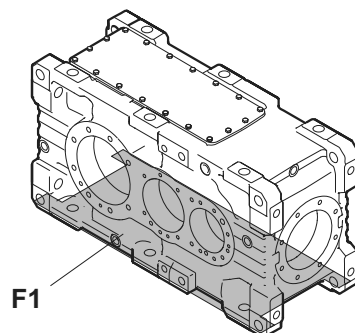
3.4 Mounting surfaces

The mounting surface is defined as the surface of a gear unit with

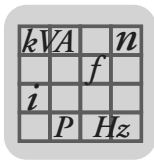
- Foot mounting (X..../B) or
- Flange mounting (X.... /F)

on which the gear unit is mounted.

Six different mounting surfaces are defined (designation F1...F6).



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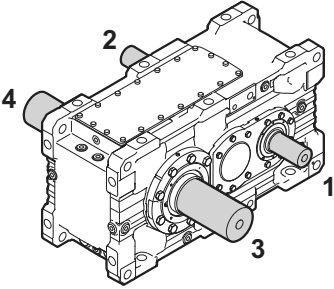
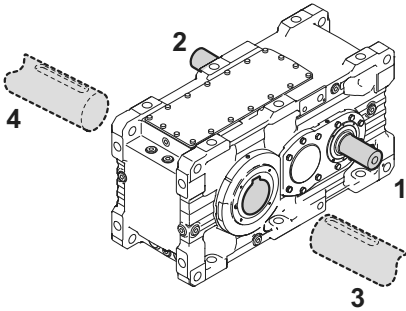
3.5 Shaft position



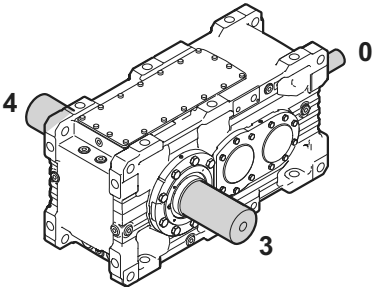
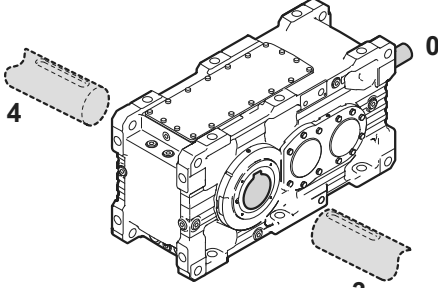
The shaft positions (0, 1, 2, 3, 4) and corresponding directions of rotation shown in the following diagrams apply to solid shaft and hollow shaft version output shafts (LSS). For other shaft positions or gear units with backstop, contact SEW-EURODRIVE.

The following shaft positions (0, 1, 2, 3, 4) are possible:

3.5.1 X.F..

Shaft positions X.FS..	Shaft positions X.FH.. / X.FA..
 315325708	 315325836

3.5.2 X.K..

Shaft position X.KS..	Shaft position X.KS.. / X.KA..
 315328908	 315329036

3.6 Mounting position and standard mounting surface

A certain standard mounting surface is assigned to each mounting position:

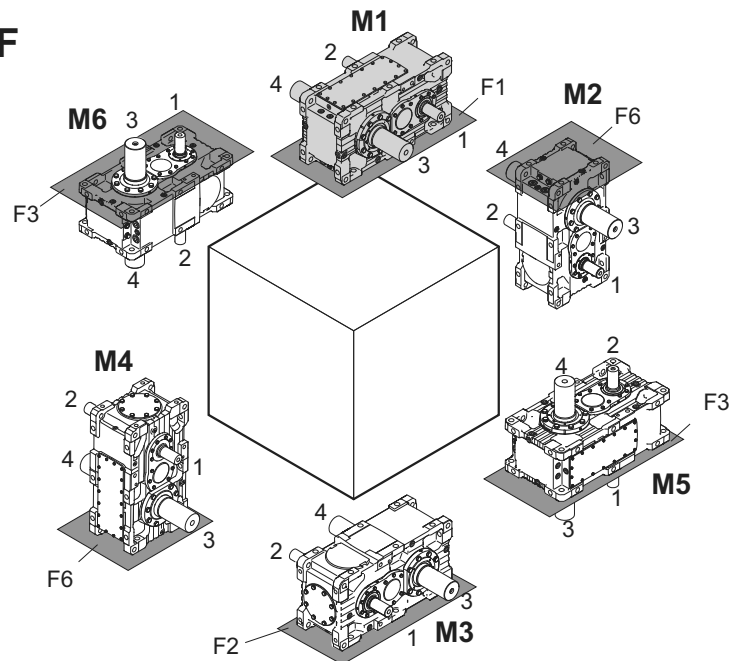


The mounting position and/or mounting surface may not differ from the order.

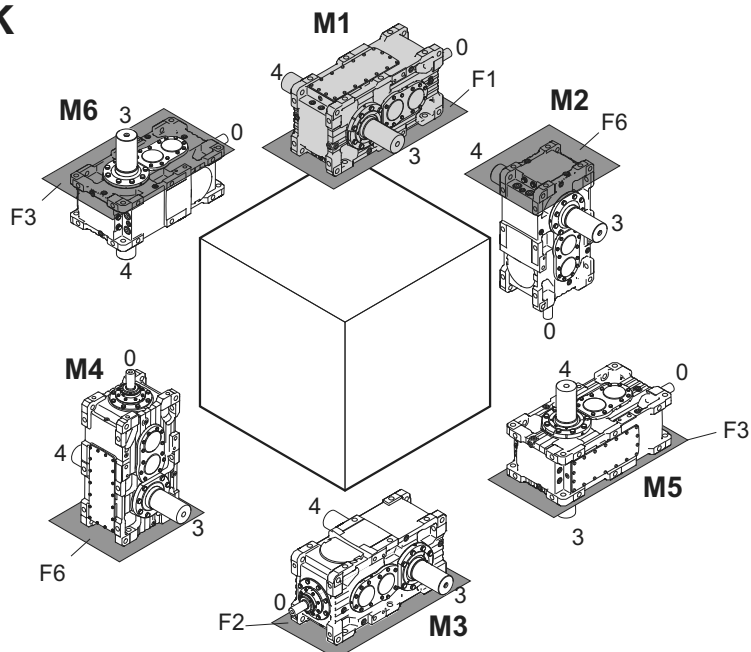


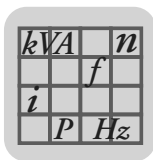
- The gear units marked in gray are standard versions.
- Delivery times may be longer for variants other than the standard assignment.
- Other mounting surfaces are possible in combination with a certain mounting position. Refer to the order-specific dimension drawing.

X.F



X.K





3.7 Direction of rotation dependencies



The gear unit can fundamentally be operated in both directions of rotation. Gear unit versions with a backstop are an exception.

The following table shows the direction of rotation dependencies between the drive and output shaft. The gear units as well as the position of the backstop are schematically shown as the solid shaft version.

3.7.1 X.F..

Shaft position	14	23	13	24
Pos. final gear	3	4	3	4
X2F...				
X3F...				
X4F...				

Shaft position	134	243	213 *	124 *	1234 *
Pos. final gear	3	4	4	3	3
X2F...					
X3F...					
X4F...					

35805196

- = Position of the backstop
- = Alternative backstop position (depending on size and gear ratio)
- * = Consult SEW-EURODRIVE when using a backstop

3.7.2 X.K..

Standard

Shaft position	03	04	034
Pos. final gear	4	3	4
X2K...			
X3K...			
X4K...			

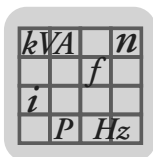
362987915

Reverse direction of rotation

Shaft position	03	04	043
Pos. final gear	3	4	3
X2K...			
X3K...			
X4K...			

362996619

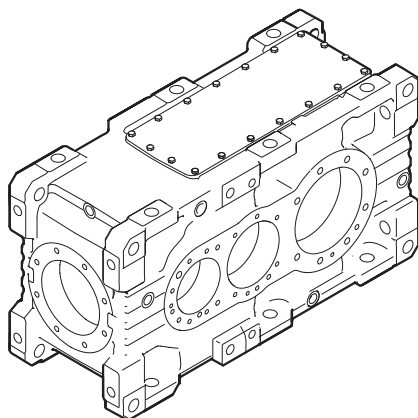
- = Position of the backstop
- = Alternative backstop position (depending on size and gear ratio)
- * = Consult SEW-EURODRIVE when using a backstop



3.8 Housing

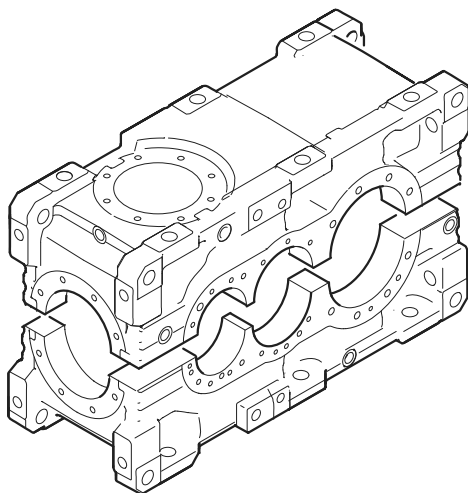
The gear unit housings are made of sturdy gray cast iron, with either monobloc or split housings with horizontal parting lines:

- Monobloc housing up to size 210



441828619

- Split housing size 220 and larger



441826955

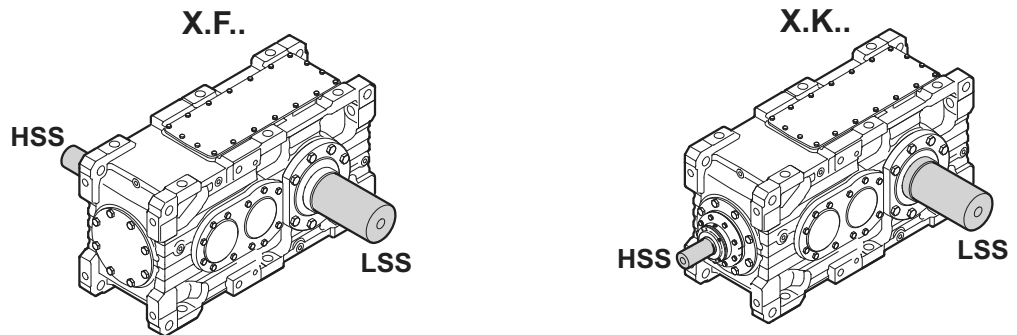
3.9 Gearing and shafts

The hardened and ground gearing is made from hardened steels. The output shafts are made of tough quenched and tempered steel.

3.10 Input and output shafts

Two types of shafts are differentiated in the catalog:

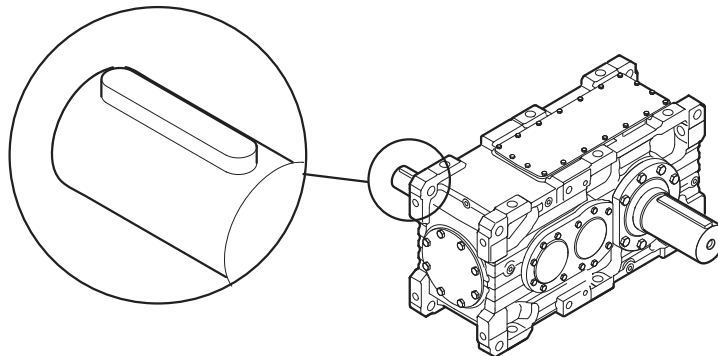
- High-speed shaft (**HSS**), normally an input shaft
- Low-speed shaft (**LSS**), normally an output shaft



324029963

3.10.1 Input shaft

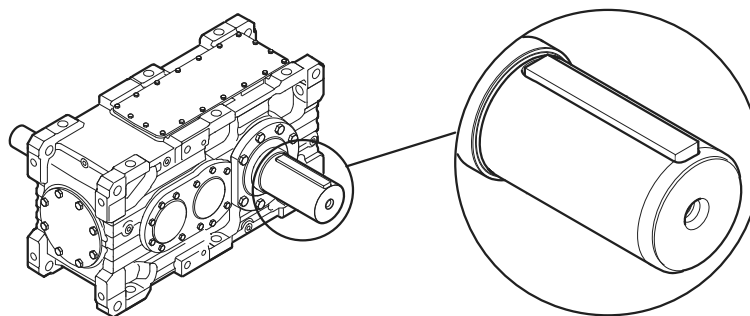
The input shaft is provided with a closed keyway (according to DIN 6885/T1) and center bore (according to DIN 332). The key that fits (according to DIN 6885/T1 – form A) is included in the scope of delivery.



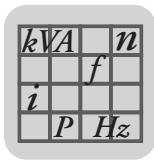
324038667

3.10.2 Output shaft as a solid shaft with key

The output shaft is provided with a closed keyway (according to DIN 6885/T1) and center bore (according to DIN 332). A key (according to DIN 6885/T1 – form B) is included in the scope of delivery. In order to simplify the mounting of output elements, such as a coupling hub, the shaft has an insertion area with a reduced diameter.



324237835

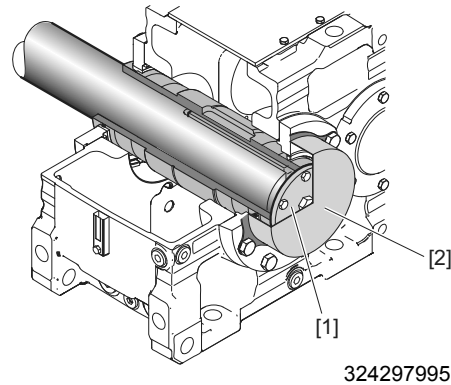


3.10.3 Output shaft as a hollow shaft with keyway

The hollow shaft is equipped with a keyway according to DIN 6885/T1.

Included in the scope of delivery:

End plate with retaining screws [1] and protection guard [2.]



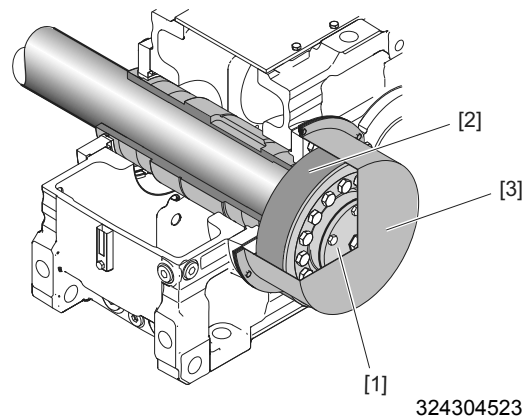
The protection guard is dust-proof. The standard sealing system is, therefore, normally used on the protection guard side.

3.10.4 Output shaft as hollow shaft with shrink disc

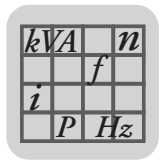
The shrink disc is positioned on the side opposite to the machine shafts.

Included in the scope of delivery:

End plate with retaining screws [1], shrink disc [2], protection guard [3]

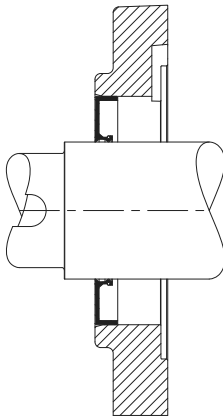
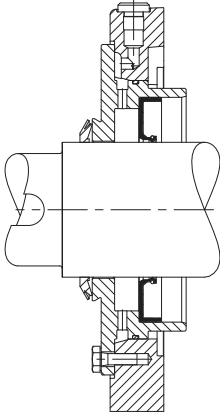
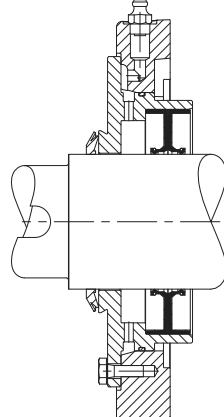
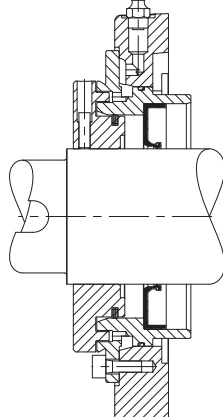


The protection guard is dust-proof. The standard sealing system is, therefore, normally used on the protection guard side.

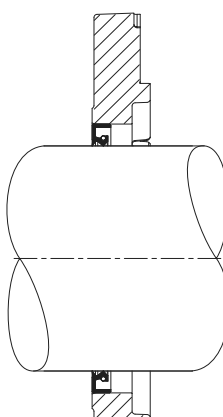
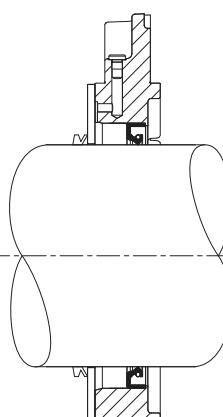
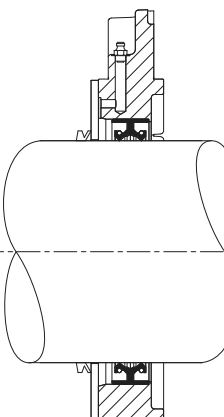
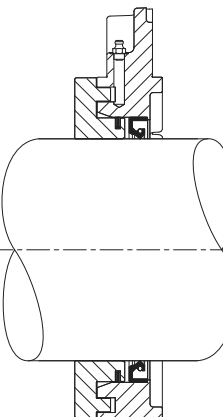


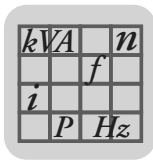
3.11 Sealing systems

3.11.1 Input shaft

Standard	Dust-proof	Dust-proof Regreasable	Radial labyrinth seal (Taconite)
Single lip seal with dust protection lip	Single lip seal with dust protection cover (not regreasable)	Double lip seal with dust protection cover (regreasable)	Single lip seal with radial labyrinth seal
• Normal environment	• Medium dust load with abrasive particles	• High dust load with abrasive particles	• Very high dust load with abrasive particles
 308250636	 308250764	 308250892	 308251020

3.11.2 Output shaft

Standard	Dust-proof	Dust-proof Regreasable	Radial labyrinth seal (Taconite)
Single lip seal with dust protection lip	Single lip seal with dust protection cover (not regreasable)	Double lip seal with dust protection cover (regreasable)	Single lip seal with radial labyrinth seal
• Normal environment	• Medium dust load with abrasive particles	• High dust load with abrasive particles	• Very high dust load with abrasive particles
 308254092	 308254220	 308254348	 308254476

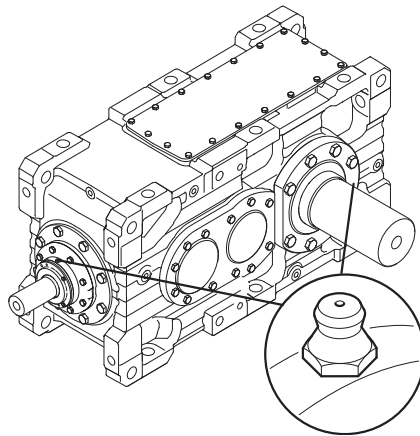


3.11.3 Greasing nipple on gear unit cover (standard)

Taper greasing nipples (according to DIN 71412 A R1/8) are normally used on the gear unit cover in regreasable sealing systems.

Regreasing should be carried out at regular intervals. The lube points are located near the input and output shafts.

Example



323616395

3.11.4 Grease nipple on the top side of the gear unit (option)

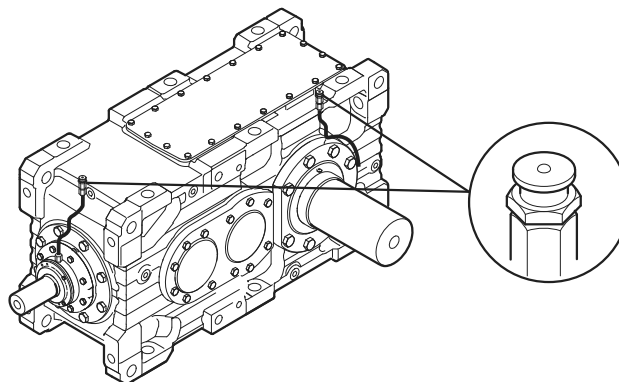
When installed in a restricted space, the lube points can be relocated to the top side of the gear unit.

When this is done, flat grease nipples (according to DIN 3404 A G1/8) are used. Regreasing should be carried out at regular intervals.

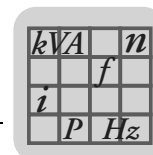
Note the following points:

- This option is normally used on drives with fans and motor adapters.
- The option applies to both input and output shafts.

Example



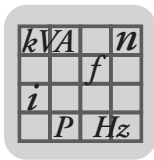
323626123



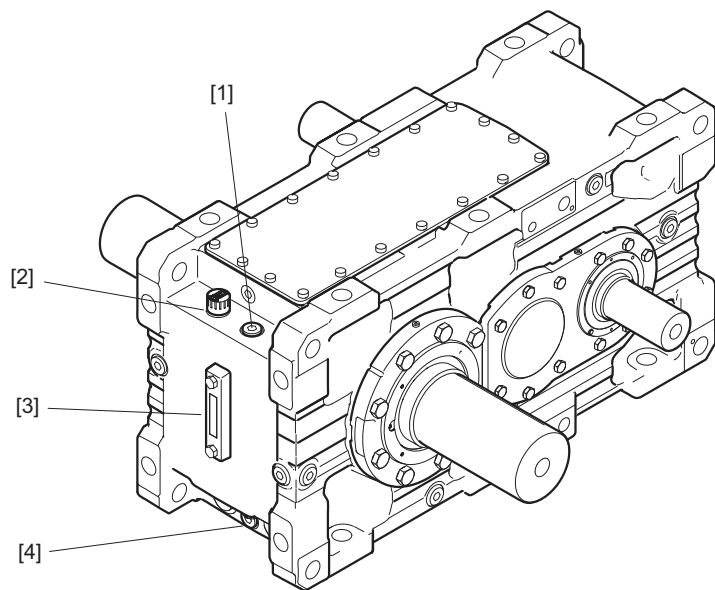
3.12 Lubrication

3.12.1 Type of lubrication

- Splash lubrication** The oil level is low; gearing and bearing parts that are not immersed in the oil bath are lubricated by splashing oil. Standard lubrication type for horizontal mounting positions (M1 or M3).
- Bath lubrication** The gear unit is (almost) completely filled with oil; all gearing and bearing positions are either completely or partly submerged in the oil bath.
- Standard lubrication type with oil compensator for:
 - Swiveling mounting positions with horizontal gear units beyond a certain inclination angle (depending on type of gear unit, version and size)
 - Vertical gear units (mounting position M5) (separate publication)
 - Upright mounting position (M4) (separate publication) with X.K gear units
 - Standard lubrication type without oil compensator for:
 - Upright mounting position (M4) with X.F gear units (separate publication)
- Pressure lubrication** The gear unit is equipped with a pump (shaft end pump or motor pump). The oil level is low and may even be reduced when compared to splash lubrication. The gearing and bearing positions that are not immersed in the oil bath are sprayed by oil through lubrication lines.
- Pressure lubrication is used when:
- Splash lubrication is not possible (see the relevant mounting positions and variants under "Bath lubrication"),
 - Instead of bath lubrication, when that is not desired or is not thermally advantageous (see the relevant mounting positions and variants).
 - A drywell version is required (only with a vertical output shaft with LSS facing down, separate publication),
 - High drive speeds are present and the speed limit for the other types of lubrication is exceeded (dependant on the gear unit size, version, and number of stages).



3.13 Accessories



366662795

- [1] Position of the oil dipstick (optional)
- [2] Breather
- [3] Oil level glass
- [4] Oil drain

3.13.1 Visual oil level check

Depending on the mounting position, SEW-EURODRIVE offers the following methods for checking the oil level.

Mounting position	Oil level check
M1	Oil level glass or oil dipstick (optional)
M3	Oil dipstick
M1 / M3	Two oil dipsticks

3.13.2 Breather

When a gear unit is vented, non-permitted pressures, which arise from heating during operation, are avoided. The gear units are normally equipped with a high-quality breather with a filter mesh of 2 μ m (0.00008 in)

3.13.3 Oil drain

The gear unit is normally equipped with an oil drain plug. An oil drain valve may be provided as an option. This allows for a drain line to be easily attached when changing the gear unit oil.

4 Design of Options and Accessories

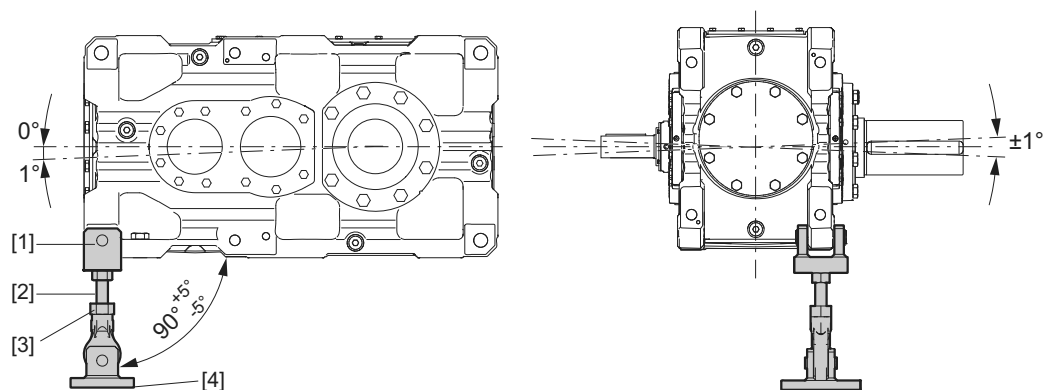
4.1 Torque arm

A torque arm is available to support the reaction torque of hollow shaft gear units in the shaft-mounted version.

The torque arm can bear tensile stress as well as thrust loads.

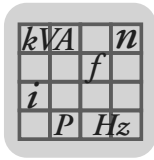
The length of the torque arm can be adjusted within a certain range.

The torque arm consists of a joint head with bolt [1], threaded bolt [2], maintenance-free joint head [3], and fork plate with bolt [4]. The design using the joint head allows for the compensation of assembly tolerances and operational displacements. Constraining forces on the output shaft are thus avoided.



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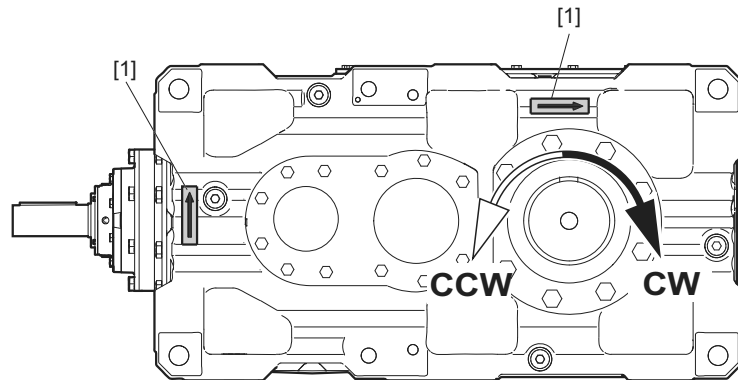
- [1] Joint head with bolt
- [2] Threaded bolt with nut
- [3] Joint head
- [4] Fork plate with bolt



4.2 Backstop

The purpose of a backstop is to prevent undesirable reverse rotation. During operation, the backstop permits rotation in only one specified direction of rotation.

The backstop functions by using centrifugal lift-off sprags. Once the lift-off speed is reached, the sprags lift off from the contact surface of the outer ring completely. The backstop is lubricated with the gear unit oil.



199930635

The direction of rotation is determined with a view to the output shaft (LSS).

- CW = Clockwise
- CCW = Counterclockwise (anti-clockwise)

The permitted direction of rotation [1] is indicated on the housing.



If the drive has a through-going output shaft, the direction of rotation of the backstop should be given as viewed towards shaft position 3.

4.3 Motor adapter

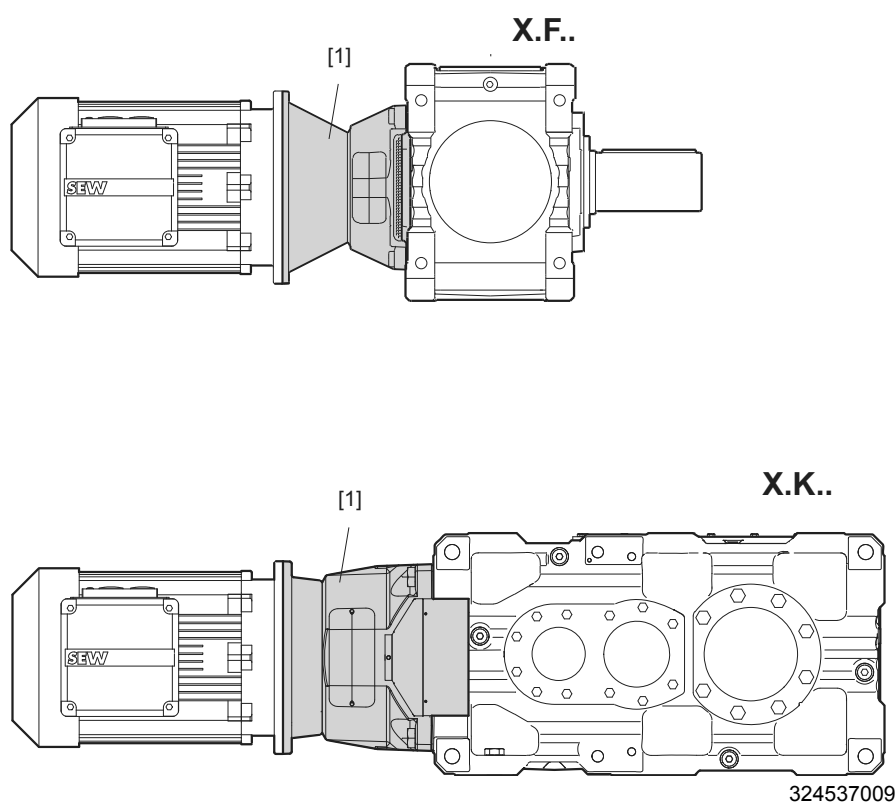
Motor adapters [1] are available for mounting:

- **IEC (B5) motors** sizes 100 to 355
- **NEMA ("C" face) motors** sizes 182 to 449

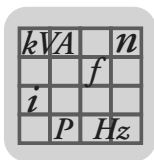
All motor adapters may be equipped with a fan for two- and three-stage gear units.

An elastic claw coupling is included in the scope of delivery of the motor adapter.

The diagrams below show the basic design of the motor adapter.



[1] Motor adapter



4.4 Drive packages on steel frame

For gear units in a horizontal mounting position, complete preassembled drive packages on a steel frame (swing base or base plate) are available.

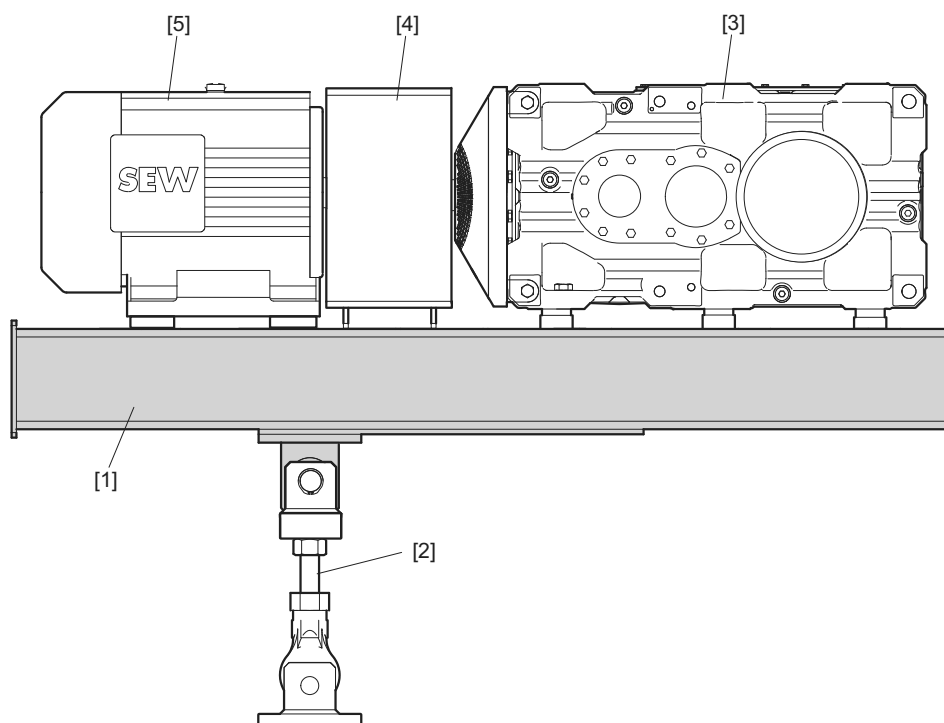
4.4.1 Swing base

A swing base is a steel frame [1] that accommodates the gear unit, (hydro) coupling and motor (and brake, if required), including protection devices, such as a guard, etc. A swing base is normally used for:

- Hollow shaft gear units or
- Solid shaft gear units with flange coupling on the output shaft.

The steel frame [1] is supported by a torque arm [2].

Example: Swing base with coupling



216568971

- [1] Swing base
- [2] Torque arm (optional)
- [3] Bevel-helical gear unit
- [4] Coupling with protection cover
- [5] Motor

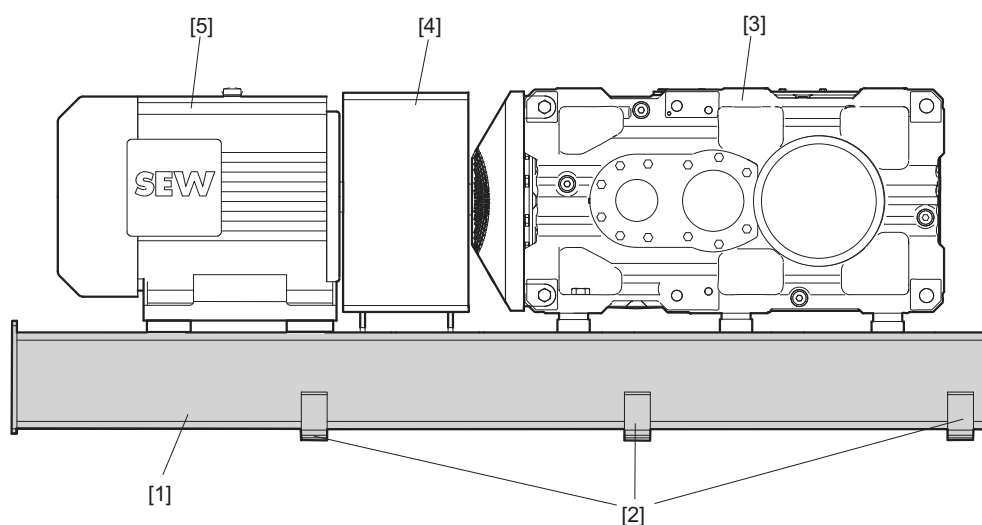
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f	
i	
P	H_z

4.4.2 Base plate

For gear units in a horizontal mounting position, complete preassembled drive packages on a base plate are available from SEW-EURODRIVE.

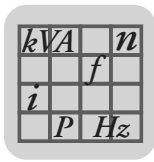
A base plate is a steel frame [1] that accommodates the gear unit, (hydro) coupling and motor (and brake, if required), including protection devices, such as guards, etc. The steel frame is supported by several foot mountings [2]. Such a frame is usually used for solid shaft gear units with elastic coupling on the output shaft.

Example: Base plate with coupling



219858571

- [1] Base plate
- [2] Foot mounting
- [3] Bevel-helical gear unit
- [4] Protection cover for coupling
- [5] Motor

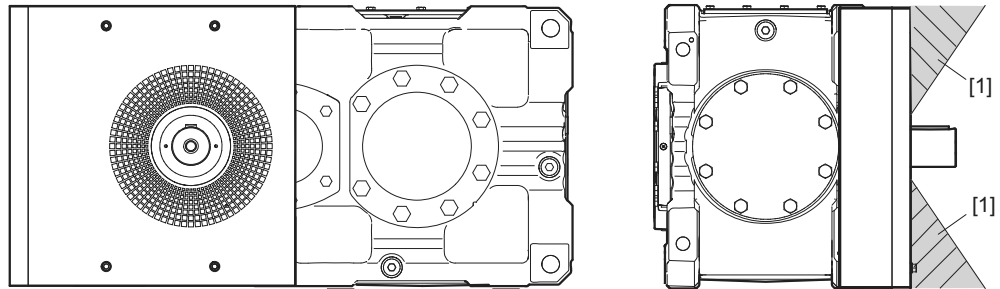


4.5 Fan

To raise the thermal rating or when the ambient conditions change after gear unit startup, a fan may be retrofitted. The direction of rotation of the gear unit does not influence the operation of the fan.

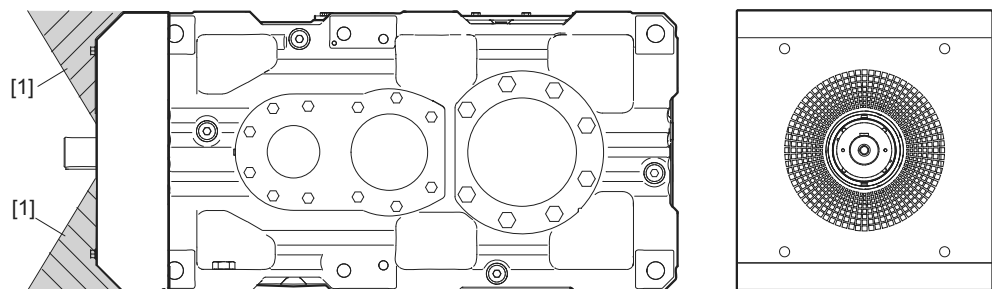
The following fan designs are available:

4.5.1 X.F.. Fan (standard)



[1] Air intake that should be kept clear

4.5.2 X.K.. Fan (standard)

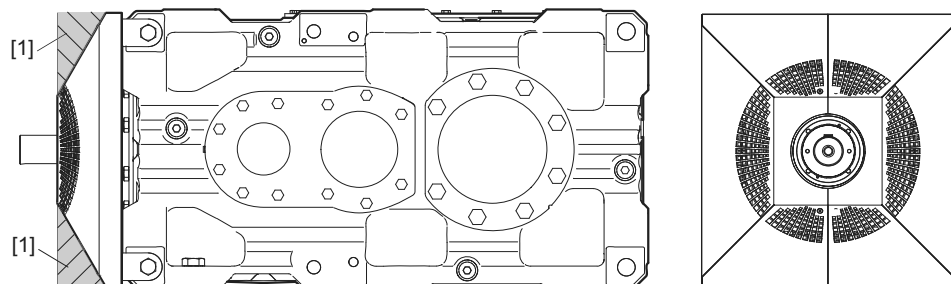


[1] Air intake that should be kept clear

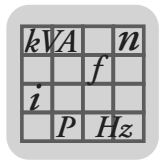
4.5.3 X.K.. Advanced (option)

When the X3K Advanced version is used, the connection element (e.g. hydraulic centrifugal coupling) can be mounted flush on the fan guard.

The air intake that must be kept clear is integrated into the fan guard.



[1] Air intake that should be kept clear



4.6 Water cooling cover

The water cooling cover is located on the gear unit's assembly opening and is provided with cooling water through a water connection. The water connection is made on-site.

The amount of heat that can be removed depends on the intake temperature and the volume flow of the cooling medium that flows through the unit. The data given in the technical specifications must be observed.



Contact SEW-EURODRIVE if chemically aggressive cooling media, such as brackish or salt water, are used.

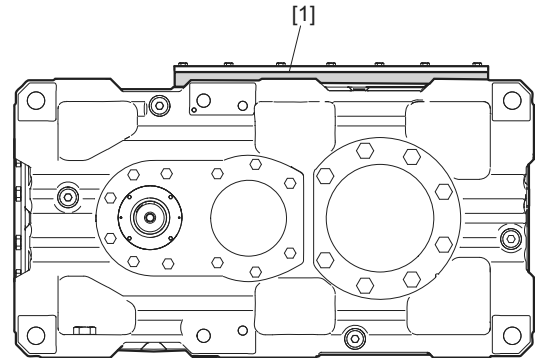
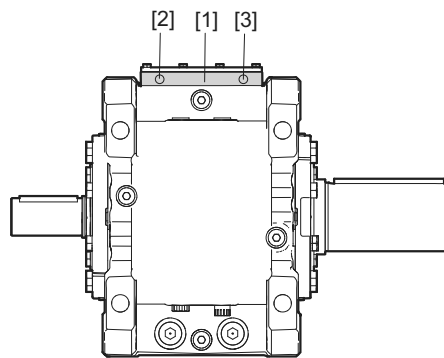
4.6.1 Design

The water cooling cover [1] is made of a corrosion-resistant aluminum alloy.

Two bores (G1/2") with pipe threads are available to connect to the cooling circuit. The piping is not included in the scope of delivery.

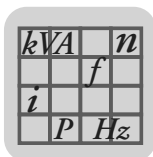
Gear units in the water cooling cover version are delivered completely assembled.

Gear units without water cooling covers may be retrofitted; consult SEW-EURODRIVE.



313740683

- [1] Water cooling cover
- [2] Inflow
- [3] Return



4.7 Water cooling cartridge

The water cooling cartridge is mounted in the gear unit's oil sump and is provided with cooling water through a water connection. The water connection is made on-site.

The amount of heat that can be removed depends on the intake temperature and the volume flow of the cooling medium that flows through the unit. See the technical specifications to determine the number of water cooling cartridges required.



Contact SEW-EURODRIVE if chemically aggressive cooling media, such as brackish or salt water, are used.

4.7.1 Design

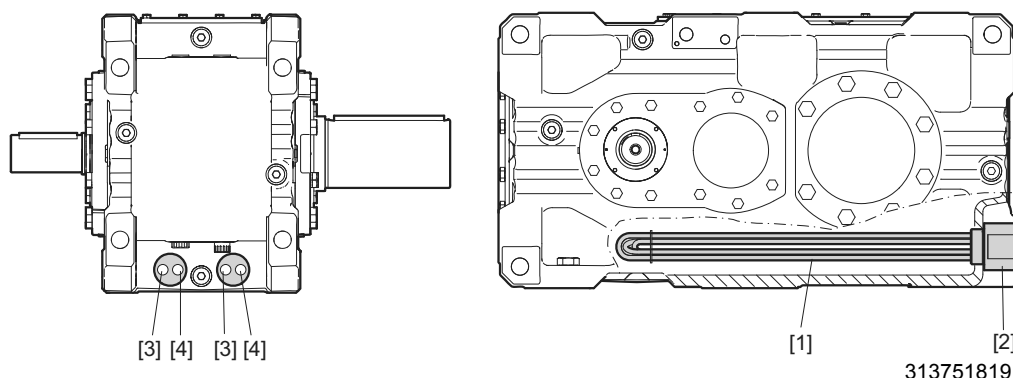
The water cooling cartridge consists of two basic parts:

- Cooling pipes (CuNi alloy)
- Connection piece (brass)

Two bores (G1/2") with pipe threads are available to connect to the cooling circuit. The piping is not included in the scope of delivery.

Gear units in the water cooling cartridge version are delivered completely assembled.

Gear units without water cooling cartridges may be retrofitted; consult SEW-EURODRIVE.



- [1] Cooling pipes
- [2] Connection piece
- [3] Return
- [4] Inflow

4.8 Oil-water cooler with motor pump

An oil-water cooling system may be used if the thermal rating of the naturally cooled gear unit or cooling using a fan on the input shaft is not sufficient. The prerequisite for using an oil-water cooling system is that appropriate cooling water is available on-site.



- Contact SEW-EURODRIVE if chemically aggressive cooling media, such as brackish or salt water, are used.
- The following versions apply for gear units with splash lubrication. The cooling system with a motor pump only cools the gear unit oil.

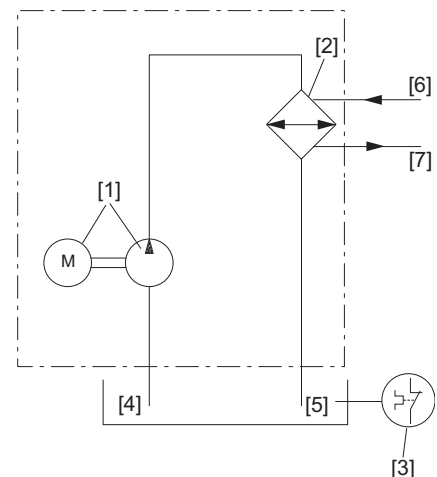
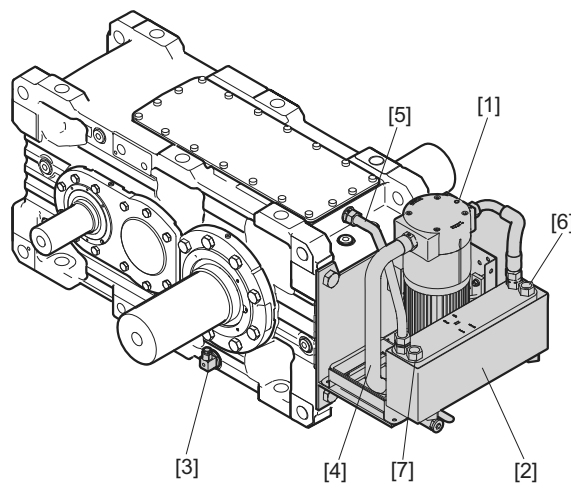
4.8.1 Design

The cooling system consists of the following:

- Pump with directly mounted asynchronous motor
- Oil-water heat exchanger
- Temperature switch with two switching points for
 - Controlled startup of the motor pump with an oil temperature of 40 °C (104 °F).
 - Monitoring of the cooling group, i.e. warning or gear unit shutdown when the oil temperature reaches 90 °C (194 °F).

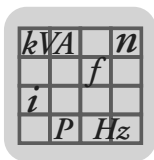
The cooling system is delivered as a complete unit, but without electrical connections. The following versions are possible:

- Directly mounted on the gear unit, including cooling circuit piping, or
- On the mounting frame, for separate installation, but without piping



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- | | |
|--|--------------------------|
| [1] Pump with motor | [5] Oil return |
| [2] Oil-water heat exchanger | [6] Cooling water inflow |
| [3] Temperature switch with two switching points | [7] Cooling water return |
| [4] Oil suction | |



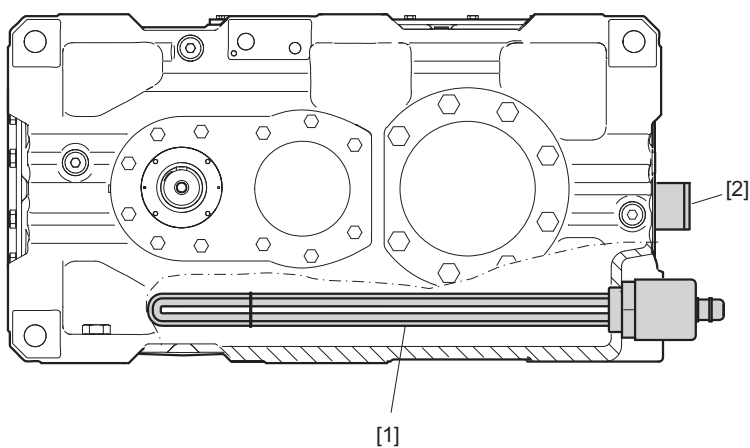
4.9 Oil heater

Oil heating is required to ensure lubrication during a cold gear unit startup when the ambient temperature is low.

4.9.1 Design

The oil heater consists of two main parts:

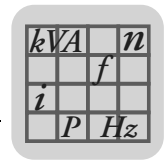
1. Resistor in the oil bath ("oil heater") with terminal box
2. Temperature sensor with thermostat



181714571

[1] Oil heater

[2] Temperature sensor with thermostat



4.10 Temperature sensor PT100

The temperature sensor PT100 can be used to measure the temperature of the oil in the gear unit.

The temperature sensor is located in the gear unit's oil sump. The exact position depends on the gear unit version and position of the shaft.

4.11 NTB temperature switch

A temperature switch with fixed switching temperatures of 70 °C, 80 °C, 90 °C or 100 °C (158 °F, 176 °F, 194 °F, 212 °F) is used for monitoring the gear unit oil temperature.

The temperature switch is normally used for the following functions:

- Early warning at 70 °C (158 °F) or 80 °C (176 °F),
- Stopping the main motor of the gear unit at 90 °C (194 °F) or 100 °C (212 °F).

To guarantee a long service life and functioning under all conditions, using a relay in the power circuit instead of a direct connection through the temperature switch is recommended.

The temperature switch is located in the gear unit's oil sump. The exact position depends on the gear unit version and position of the shaft.



5 Assembly/Installation

5.1 Required tools/resources

Not included in the scope of delivery:

- Set of wrenches
- Torque wrench
- Mounting device
- Compensation elements (shims, spacing rings), if necessary
- Fasteners for drive and output elements
- Lubricant (e.g. NOCO[®] fluid from SEW-EURODRIVE)
- For hollow shaft gear units → aids for assembly/disassembly onto the machine shaft
- Securing components for the gear unit base

5.2 Tightening torques

Bolt/nut	Tightening torque bolt/nut Strength class 8.8 [Nm (in·lb)]
M6	11 (97)
M8	25 (220)
M10	48 (420)
M12	86 (760)
M16	210 (1860)
M20	410 (3630)
M24	710 (6280)
M30	1450 (12,830)
M36	2500 (22,130)
M42	4000 (35,400)
M48	6000 (53,100)
M56	9600 (84,970)



The bolts must not be lubricated during assembly.



5.3 Securing the gear unit

The following table shows the thread sizes and the tightening torques of the individual gear unit sizes.

Gear unit size	Bolt/nut	Tightening torque bolt/nut Strength class 8.8 [Nm (in·lb)]
X.180	M36	2500 (22,130)
X.190		
X.200	M42	4000 (35,400)
X.210		
X.220		
X.230		
X.240	M48	6000 (53,100)
X.250		



The bolts must not be lubricated during assembly.

5.4 Tolerances

5.4.1 Shaft ends

Diameter tolerance in accordance with DIN 748:

- ∅ ≤ 50 mm (2.0 in) → ISO k6
- ∅ > 50 mm (2.0 in) → ISO m6

Center bores according to DIN 332, part 2 (Type D..):

- ∅ > 16...21 mm (0.63...0.83 in) → M6
- ∅ > 21...24 mm (0.83...0.94 in) → M8
- ∅ > 24...30 mm (0.94...1.2 in) → M10
- ∅ > 30...38 mm (1.2...1.5 in) → M12
- ∅ > 38...50 mm (1.5...2.0 in) → M16
- ∅ > 50...85 mm (2.0...3.3 in) → M20
- ∅ > 85...130 mm (3.3...5.12 in) → M24
- ∅ > 130...225 mm (5.12...8.86 in)¹⁾ → M30
- ∅ > 225...320 mm (8.86...12.6 in)¹⁾ → M36
- ∅ > 320...500 mm (12.6...197 in)¹⁾ → M42

1) Dimensions not according to DIN 332; the thread depth including the counterbore is at least twice that of the rated thread diameter

Keys according to DIN 6885 (domed type)

5.4.2 Hollow shaft

Diameter tolerance:

- ∅ → ISO H7 for hollow shafts with shrink discs
- ∅ → ISO H8 for hollow shafts with keyway

5.4.3 Mounting flange

Centering shoulder tolerance: ISO f7

**5.5 Notes on installing the gear unit**

- Strictly observe the safety notes in the individual sections.
- The most important technical data is included on the nameplate. Additional data relevant for operation is available in drawings, order confirmations or any order-specific documentation.
- Install/mount the gear unit only in the specified mounting position on a level, vibration-damping, and torsionally rigid support structure. Do not deform housing legs and mounting flanges against each other.
- Work on the gear unit only when the machine is not in use. Prevent the drive unit from starting up unintentionally (for example by locking the keyswitch or removing the fuses from the power supply). Place an information sign near the ON switch to warn that the gear unit is being worked on.
- The plugs for checking and draining oil and the breather valves must be freely accessible.
- Use plastic inserts (2 to 3 mm [0.08 to 0.1 in] thick) if there is a risk of electro-chemical corrosion between the gear unit and the driven machine (connection between different metals such as cast iron and high-grade steel). Also fit the plugs with plastic washers. Ground the housing additionally – use the grounding bolts on the motor.
- Only authorized personnel may assemble gear head units with motors and adapters. Please contact SEW-EURODRIVE.
- Do not weld anywhere on the drive. Do not use the drive as a ground point for welding work. Welding may destroy gearing parts and bearings.
- Protect rotating drive parts, such as couplings, gears, or belt drives, using suitable devices that protect from contact.
- Units installed outdoors must be protected from the sun. Suitable protective devices are required, such as covers or roofs. When using these, avoid heat accumulation. The operator must ensure that foreign objects do not impair the function of the gear unit (e.g., by falling objects or coverings).
- Protect the gear unit from direct cold air currents. Condensation may cause water to accumulate in the oil.
- Gear units are supplied with a coating suitable for use in damp areas or in the open air. Any damage to the coating (e.g. on the breather valve) must be repaired.



5.6 Preliminary work

Check that the following conditions have been met:

- The information on the motor's nameplate matches the voltage supply system.
- The drive has not been damaged during transportation or storage.
- Ambient temperature according to the nameplate.
- The drive must **not** be assembled in the following ambient conditions:
 - Potentially explosive area
 - Oils
 - Acids
 - Gases
 - Vapors
 - Radiation

5.6.1 Removing protective agents



Ensure that there is sufficient ventilation when using solvents. There is a risk of explosion. No open flames.



Risk of material damage.

Do not let the solvent come into contact with the sealing lips of the oil seals.

- You must clean the output shafts and flange surfaces thoroughly to ensure they are free of anti-corrosion agents, contamination or similar. Use a standard solvent.
- Protect all oil seals against direct contact with abrasive substances (such as sand, dust, shavings).

5.6.2 Extended storage

Please note: The service life of the lubricant in the bearings is reduced if the unit is stored for ≥ 1 year (only applies to bearings with grease lubrication).

Replace the corresponding screw plug with the enclosed breather.

5.6.3 Filling with oil



Fill the gear unit with the oil grade and oil volume specified on the nameplate (see section 7):

- Fill to volume suitable for the mounting position and lubrication type (see nameplate)
- Check oil level using the oil level glass or the oil dipstick



5.7 Installing the gear unit



The foundation must be level and flat, the gear unit may not be deformed when the retaining screws are tightened.

To ensure quick and successful mounting, the type of foundation should be correctly selected and the mounting carefully planned in advance. Foundation drawings with all necessary construction and dimension details should be available.

To avoid harmful vibrations and oscillations, adequate rigidity must be ensured when mounting the gear unit on a steel frame. The foundation must be dimensioned according to the weight and torque of the gear unit, taking into account the forces acting on the gear unit.

Tighten retaining screws or nuts to the specified torque. Use the screws and tightening torques specified in section 5.3.



The dimensions and layout of the supply connections are given in the illustrations included in the order documents.



The service life of the shafts, bearings and couplings depends on the precision of the alignment of the shaft axes with each other. Always try to align them so that there is zero deviation. When doing so, you should also consult the special operating instructions regarding the requirements of the couplings, for example.



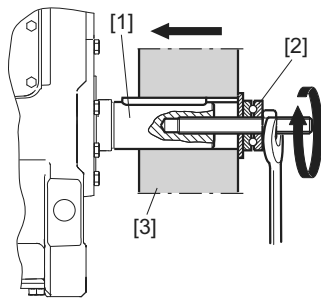
Failure to observe this may result in shaft breakage, which could endanger the life and health of persons.



5.8 Gear units with solid shaft

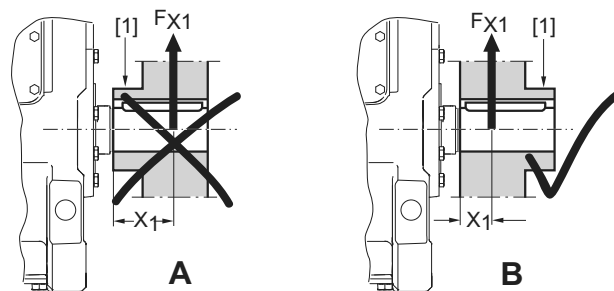
5.8.1 Mounting input and output components

The following illustrations show a mounting device for installing couplings or hubs on gear unit or motor shaft ends. It may be possible to dispense with the thrust bearing on the mounting device.



356867979

- [1] Shaft end [3] Coupling hub
[2] Thrust bearing



357001227

Avoid impermissibly high overhung loads: Install gear or chain sprockets according to illustration **B**.

- A Incorrect [1] Hub
B Correct



- Only use a mounting device for installing input and output elements. Use the center bore and the thread on the shaft end for positioning.
- Never force belt pulleys, couplings, pinions, etc. onto the shaft end by hitting them with a hammer. This may damage the bearings, housing and the shaft.
- When using belt pulleys, make sure the belt is tensioned correctly in accordance with the manufacturer's instructions.
- Input and output elements, such as couplings, must be equipped with a touch guard.
- Power transmission elements should be balanced after installation and must not give rise to excessive radial or axial forces.



Mounting is easier if you first apply lubricant to the output element and/or heat it up briefly (to 80 ... 100 °C [176 ... 212 °F]).

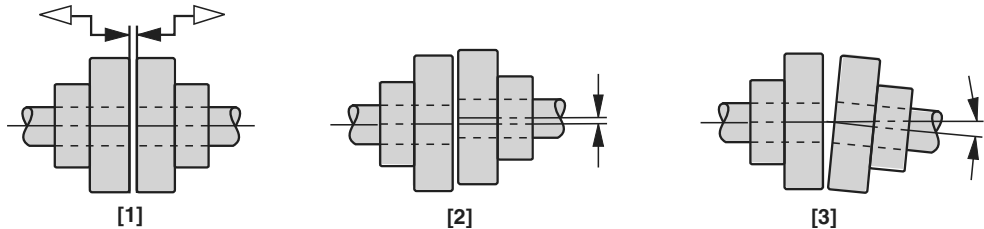


5.8.2 Couplings

Mounting tolerances



When mounting couplings, the following mounting tolerances may arise. In order to ensure trouble-free operation and long service life, these should be corrected according to the manufacturer's specifications.



357835788

- [1] Axial misalignment (maximum and minimum clearance) [3] Angular misalignment
[2] Axial misalignment (concentric running fault)

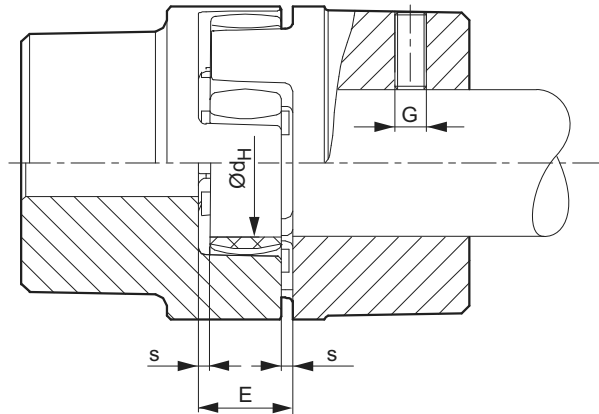
The following table shows various methods for measuring the differing tolerances.

Measuring instruments	Angular misalignment	Axial misalignment
Feeler gauge	This method only achieves an accurate result when the deviation of the coupling faces is eliminated by turning both coupling halves by 180° and then calculating the average value from the difference ($a_1 - a_2$).	The following illustration shows the measurement of axial misalignment using a straight-edge. Permissible values for axial misalignment are usually so small that the best measurement results can be achieved with a micrometer dial. If you rotate one coupling half together with the micrometer dial and divide the deviation by two, the deviation displayed on the micrometer dial indicates the misalignment (dimension "b") that includes the axial misalignment of the other coupling half.
Micrometer dial	A prerequisite for this measuring method is that there is no axial play in the shaft bearings when the shafts rotate. If this condition is not fulfilled, the axial play between the faces of the coupling halves must be eliminated. As an alternative, you can use two micrometer dials positioned on the opposite sides of the coupling (to calculate the difference of the two micrometer dials when rotating the coupling).	The following figure shows the how to measure axial misalignment using a more accurate measuring method, as described above. The coupling halves are rotated together without letting the point of the micrometer dial slide onto the measuring surface. The axial misalignment is obtained by dividing the deviation displayed on the micrometer dial (dimension "b").



ROTEX coupling

The low-maintenance, elastic ROTEX coupling is capable of compensating for a radial extension as well as an angular misalignment. Careful and exact alignment of the shafts ensures long service life of the coupling.



358469515

Coupling size	Mounting dimensions			Set screw	
	E [mm (in)]	s [mm (in)]	$\varnothing d_H$ [mm (in)]	Thread	Tightening torque [Nm (in·lb)]
14	13 (0.51)	1.5 (0.59)	10 (0.39)	M4	2.4 (21)
19	16 (0.63)	2 (0.08)	18 (0.7)	M5	4.8 (42)
24	18 (0.7)	2 (0.08)	27 (1.1)	M5	4.8 (42)
28	20 (0.79)	2.5 (0.10)	30 (1.2)	M6	8.3 (73)
38	24 (0.94)	3 (0.1)	38 (1.5)	M8	20 (180)
42	26 (1.0)	3 (0.1)	46 (1.8)	M8	20 (180)
48	28 (1.1)	3.5 (0.14)	51 (2.0)	M8	20 (180)
55	30 (1.2)	4 (0.2)	60 (2.4)	M10	40 (350)
65	35 (1.4)	4.5 (0.18)	68 (2.7)	M10	40 (350)
75	40 (1.6)	5 (0.2)	80 (3.1)	M10	40 (350)
90	45 (1.8)	5.5 (0.22)	100 (3.94)	M12	69 (610)
100	50 (2.0)	6 (0.2)	113 (4.45)	M12	69 (610)
110	55 (2.2)	6.5 (0.26)	127 (5.00)	M16	195 (1,730)
125	60 (2.4)	7 (0.3)	147 (5.79)	M16	195 (1,730)
140	65 (2.6)	7.5 (0.30)	165 (6.50)	M20	201 (1,780)
160	75 (3.0)	9 (0.4)	190 (7.48)	M20	201 (1,780)
180	85 (3.3)	10.5 (0.413)	220 (8.66)	M20	201 (1,780)



During assembly, the shaft distance must be strictly observed (dimension E) to ensure axial play of the coupling.



Assembly/Installation

Gear unit with hollow shaft keyed connection

5.9 Gear unit with hollow shaft keyed connection

5.9.1 General information

The material of the machine shaft as well as the keyed connection should be dimensioned by the customer according to the loads that will occur. The shaft material should have a yield point of at least 320 N/mm² (46,400 lb/in²).

The key length should be, at minimum, that shown in the dimension sheets (→ section 5.9.3). If a longer key is used, it should be aligned symmetrically to the hollow shaft.

With a through-going machine shaft or axial forces, SEW-EURODRIVE recommends that the machine shaft be designed with a contact shoulder. In order to prevent the retaining screw of the machine shaft from loosening upon a reversing load direction, it should be secured with a suitable threadlocker. If necessary, two eccentric retaining screws may be used.

5.9.2 Thread sizes/tightening torques

SEW-EURODRIVE recommends the following thread sizes and tightening torques:

Gear unit size	Recommended thread size		Tightening torque [Nm (in·lb)] Retaining screw [6] ¹⁾ Strength class 8.8
	Ejector screw [8] ¹⁾ (threads in the end plate)	- Threaded rod [2]¹⁾ - Nut (DIN934) [5]¹⁾ - Retaining screw [6]¹⁾ Strength class 8.8	
XA180-230	M36	M30	1,450 (12,830)
XA240-250	M42	M36	2,500 (22,130)

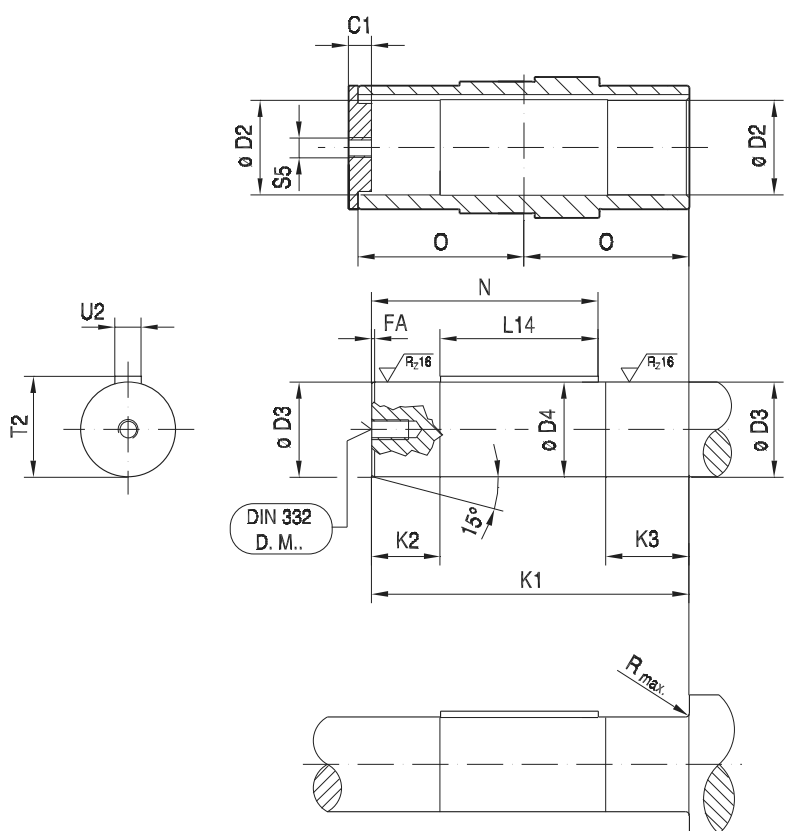
1) See the following pages

Gear unit size	Thread size for 6 x retaining screws [3] ¹⁾ Strength class 10.9	Tightening torque	
		Assembly / Operating status [Nm (in·lb)]	Disassembly [Nm (in·lb)]
XA180-190	M10x30	48 (420)	Apply hand pressure
XA200-230	M12x30	86 (760)	Apply hand pressure
XA240-250	M16x40	210 (1860)	Apply hand pressure

1) See the following pages



5.9.3 Dimensions of the machine shaft



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	C1	D2	D3	D4	FA	K1	K2	K3	L14	N	O	R _{max.}	S5	T2	U2	DIN 332 D..
X..A180	36	165 ^{H8}	165 _{js7}	165 _{h11}	3	565	109	128	300	423	292	2	M36	174.4	40 ^{JS9}	M30 ¹⁾
X..A190	36	165 ^{H8}	165 _{js7}	165 _{h11}	3	565	109	128	300	423	292	2	M36	174.4	40 ^{JS9}	M30 ¹⁾
X..A200	36	180 ^{H8}	180 _{js7}	180 _{h11}	3	620	130	149	320	460.5	319.5	2	M36	190.4	45 ^{JS9}	M30 ¹⁾
X..A210	36	190 ^{H8}	190 _{js7}	190 _{h11}	3	620	130	149	320	460.5	319.5	2	M36	200.4	45 ^{JS9}	M30 ¹⁾
X..A220	36	210 ^{H8}	210 _{js7}	210 _{h11}	3	686	133	152	370	518.5	352.5	2.5	M36	221.4	50 ^{JS9}	M30 ¹⁾
X..A230	36	210 ^{H8}	210 _{js7}	210 _{h11}	3	686	133	152	370	518.5	352.5	2.5	M36	221.4	50 ^{JS9}	M30 ¹⁾
X..A240	45	230 ^{H8}	230 _{js7}	230 _{h11}	3	778	147	170	370	562.5	400.5	2.5	M42	241.4	50 ^{JS9}	M36 ¹⁾
X..A250	45	240 ^{H8}	240 _{js7}	240 _{h11}	3	778	147	170	370	562.5	400.5	2.5	M42	252.4	56 ^{JS9}	M36 ¹⁾

1) Dimensions not according to DIN 332; the thread depth including the counterbore is at least twice that of the thread diameter



Assembly/Installation

Gear unit with hollow shaft keyed connection

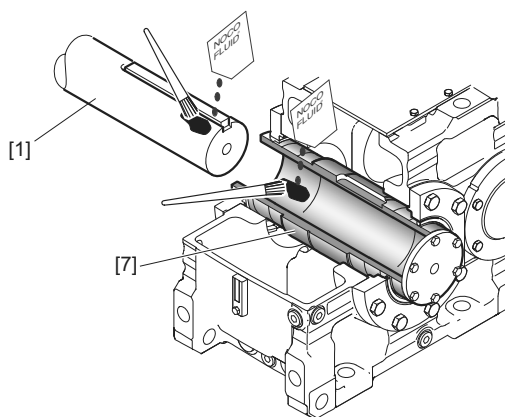
5.9.4 Mounting the gear unit onto the machine shaft



- Included in the scope of delivery:
 - Retaining screws [3] and end plate [4]
- **Not** included in the scope of delivery:
 - Threaded rod [2], nut [5], retaining screw [6], ejector screw [8]

The selection of the thread and length of the threaded rod as well as the retaining screw depends on the design of the customer's surrounding structure.

1. Apply NOCO® fluid to the hollow shaft [7] and the shaft end of the machine shaft [1].



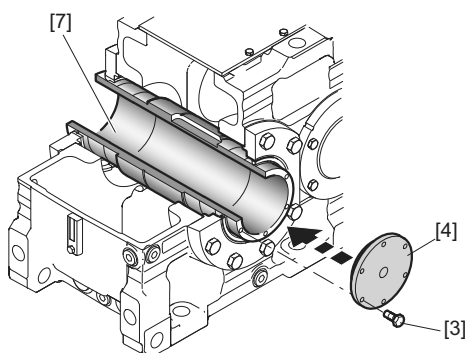
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- [1] Machine shaft
[7] Hollow shaft

2. Use the retaining screws [3] to attach the end plate [4] to the hollow shaft [7] (see section 5.2 for tightening torques) and screw the threaded rod [2] onto the machine shaft [1].

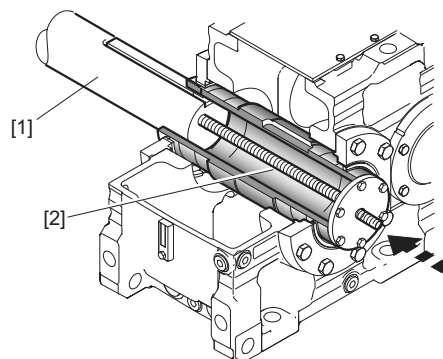


Applying lubricant to the threaded spindle and nut prior to assembly makes the job easier.



- [1] Machine shaft
[2] Threaded rod

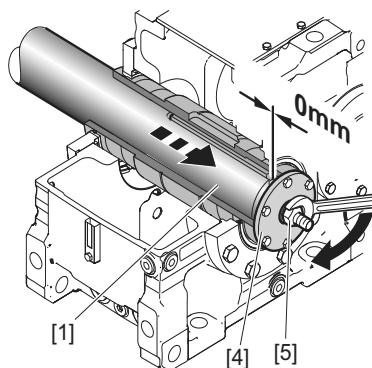
- [3] Retaining screws
[4] End plate
[7] Hollow shaft



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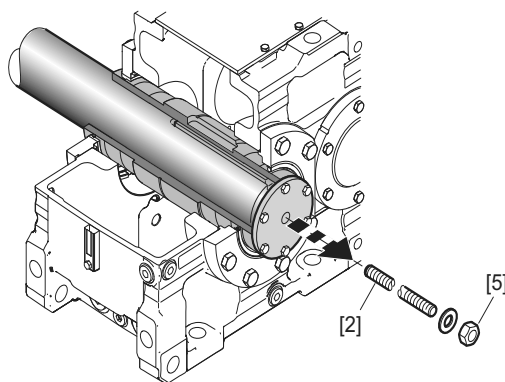
3. Tighten the machine shaft [1] with the nut [5] until the shaft end of the machine shaft [1] and the end plate [4] meet.



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[1] Machine shaft [4] End plate [5] Nut

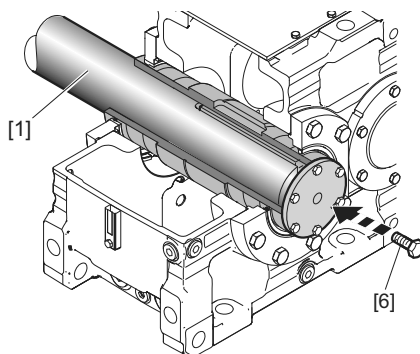
4. Loosen the nut [5]. Screw the threaded rod [2] out.



310655244

[2] Threaded rod [5] Nut

5. Secure the machine shaft [1] with the retaining screw [6] (see section 5.2 for tightening torques). The retaining screw should also be locked with a suitable thread-locker.



310415883

[1] Machine shaft [6] Retaining screw



Be sure to properly attach the protection cover after completing assembly.

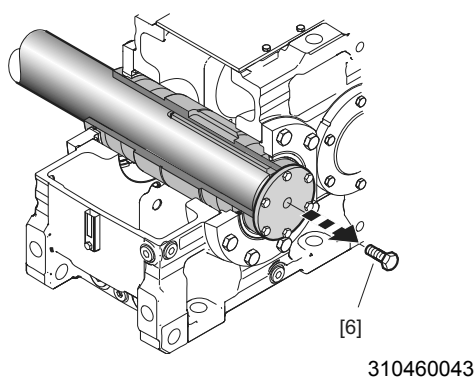


Assembly/Installation

Gear unit with hollow shaft keyed connection

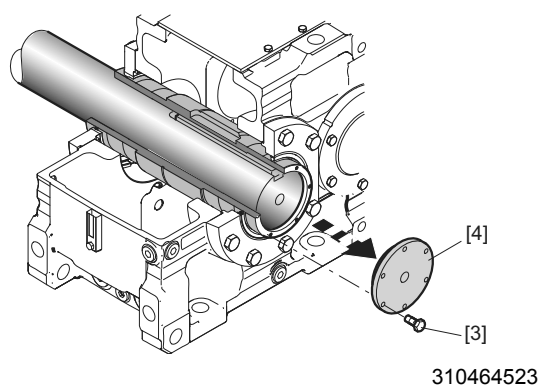
5.9.5 Disassembling the gear unit from the machine shaft

1. Loosen the retaining screw [6].



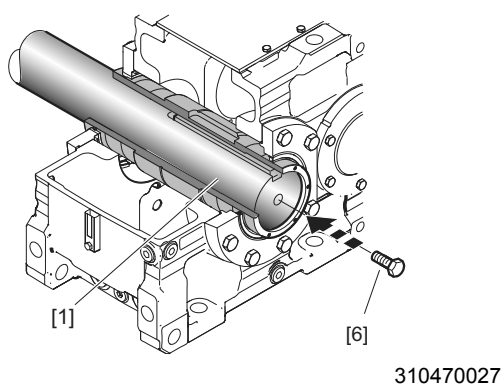
[6] Retaining screw

2. Remove the retaining screws [3] and the end plate [4].



[3] Retaining screw
[4] End plate

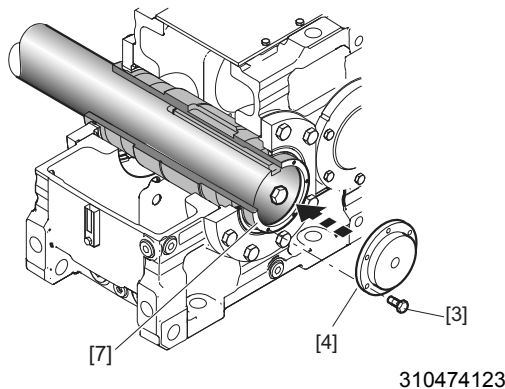
3. To protect the center bore, screw the retaining screw [6] into the machine shaft [1].



[1] Machine shaft
[6] Retaining screw



4. To disassemble the gear unit, flip the end plate [4] over and use the retaining screws [3] to reattach it to the hollow shaft [7]. The retaining screws [3] should be tightened hand-tight.



- [4] End plate
[3] Retaining screw
[7] Hollow shaft

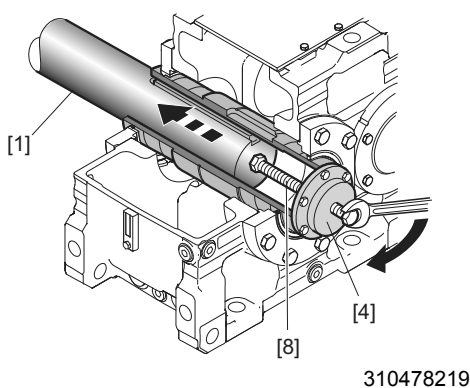
5. Thread the ejector screw [8] into the end plate [4] to remove the gear unit from the machine shaft [1].



Only use the hollow shaft for bracing during disassembly. Bracing against other gear unit parts may cause damage.



Applying lubricant to the threaded spindle and to the threads in the end plate prior to disassembly makes the job easier.



- [1] Machine shaft
[4] End plate
[8] Ejector screw



Assembly/Installation

Gear unit with hollow shaft and shrink disc

5.10 Gear unit with hollow shaft and shrink disc

5.10.1 General

The material of the machine shaft should be dimensioned by the customer according to the loads that will occur. The shaft material should have a yield point of at least 320 N/mm² (46,400 lb/in²).

5.10.2 Thread sizes/tightening torques

SEW-EURODRIVE recommends the following thread sizes and tightening torques:

Gear unit size	Recommended thread size		Tightening torque [Nm (in·lb)] Retaining screw [6] ¹⁾ Strength class 8.8
	Ejector screw [8] ¹⁾ (threads in the end plate)	- Threaded rod [2]¹⁾ - Nut (DIN934) [5]¹⁾ - Retaining screw [6]¹⁾ Strength class 8.8	
XH180-230	M36	M30	1450 (12,830)
XH240-250	M42	M36	2500 (22,130)

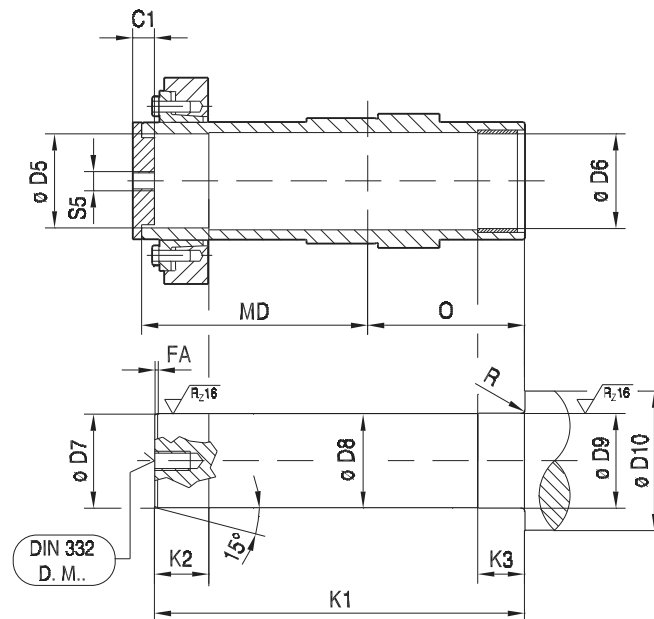
1) See the following pages

Gear unit size	Thread size for 6 x retaining screws [3] ¹⁾ Strength class 10.9	Tightening torque	
		Assembly / Operating status [Nm (in·lb)]	Disassembly [Nm (in·lb)]
XH180-190	M10x30	48 (420)	Apply hand pressure
XH200-230	M12x30	86 (760)	Apply hand pressure
XH240-250	M16x40	210 (1860)	Apply hand pressure

1) See the following pages



5.10.3 Dimensions of the machine shaft



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	C1	ø D5	ø D6	ø D7	ø D8	ø D9	ø D10	FA	K1	K2	K3	MD	O	R	S5	DIN 332 D..
X..H180	36	165 ^{H7}	166	165 _{g6}	165 _{h11}	166 _{m6}	180	3	672 ₋₁	83	83	400	292	4	M36	M30 ¹⁾
X..H190	36	165 ^{H7}	166	165 _{g6}	165 _{h11}	166 _{m6}	180	3	672 ₋₁	83	83	400	292	4	M36	M30 ¹⁾
X..H200	36	180 ^{H7}	181	180 _{g6}	180 _{h11}	181 _{m6}	195	3	750 ₋₁	101	83	450.5	319.5	4	M36	M30 ¹⁾
X..H210	36	190 ^{H7}	191	190 _{g6}	190 _{h11}	191 _{m6}	205	3	753 ₋₁	106	83	453.5	319.5	4	M36	M30 ¹⁾
X..H220	36	210 ^{H7}	211	210 _{g6}	210 _{h11}	211 _{m6}	230	3	830 ₋₁	118	108	497.5	352.5	5	M36	M30 ¹⁾
X..H230	36	210 ^{H7}	211	210 _{g6}	210 _{h11}	211 _{m6}	230	3	830 ₋₁	118	108	497.5	352.5	5	M36	M30 ¹⁾
X..H240	45	230 ^{H7}	231	230 _{g6}	230 _{h11}	231 _{m6}	250	3	948 ₋₁	140	108	571.5	400.5	5	M42	M36 ¹⁾
X..H250	45	240 ^{H7}	241	240 _{g6}	240 _{h11}	241 _{m6}	260	3	948 ₋₁	140	108	571.5	400.5	5	M42	M36 ¹⁾

1) Dimensions not according to DIN 332; the thread depth including the counterbore is at least twice that of the rated thread diameter



Assembly/Installation

Gear unit with hollow shaft and shrink disc

5.10.4 Mounting the gear unit onto the machine shaft



- Included in the scope of delivery:
 - Retaining screws [3] and end plate [4].
- **Not** included in the scope of delivery:
 - Threaded rod [2], nut [5], retaining screw [6], ejector screw [8].

The selection of the thread and length of the threaded rod as well as the retaining screw depends on the design of the customer's surrounding structure.

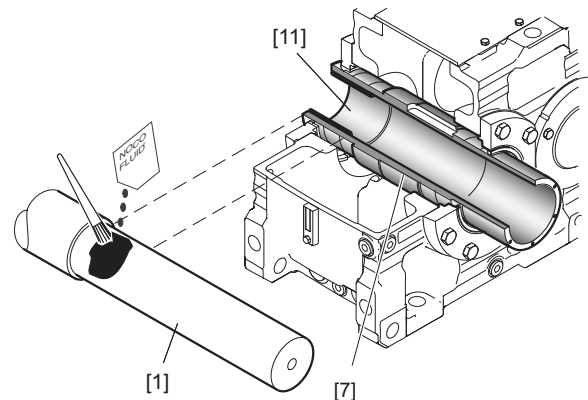
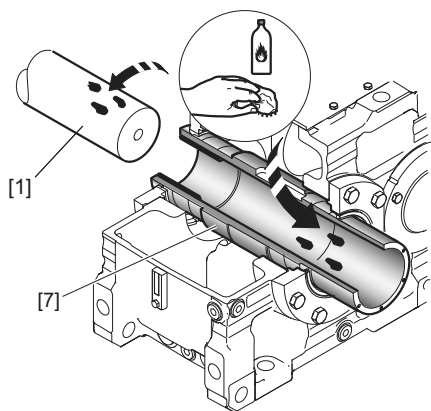


Ensure that the dimensions of the machine shaft correspond to SEW specifications. See previous page.

1. Before assembling the gear unit, degrease the hollow shaft [7] and the machine shaft [1] and apply some NOCO[®] fluid to the machine shaft [1] in the socket area [11].



The clamping area of the shrink disc between the machine shaft [1] and the hollow shaft [7] must remain absolutely free of any grease. Thus, never apply NOCO[®] Fluid directly to the socket [11], since the paste may get into the clamping area of the shrink disc when the input shaft is put on.

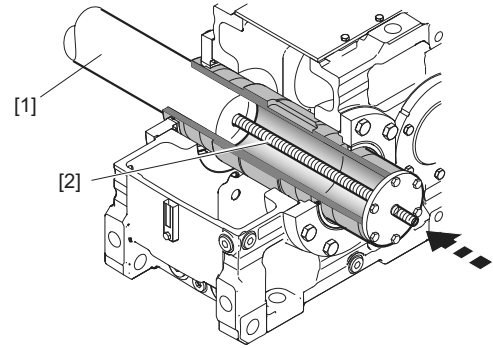
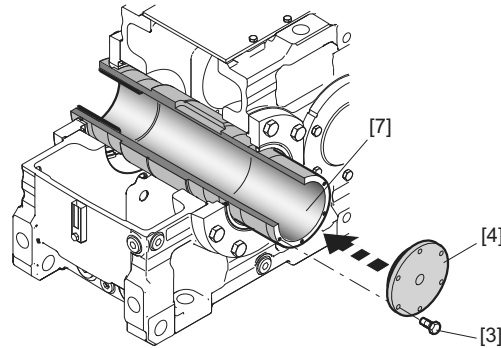


- [1] Machine shaft
- [7] Hollow shaft
- [11] Socket

356508044



- Use the retaining screws [3] to attach the end plate [4] to the hollow shaft [7] (see section 5.2 for tightening torques) and screw the threaded rod [2] onto the machine shaft [1].



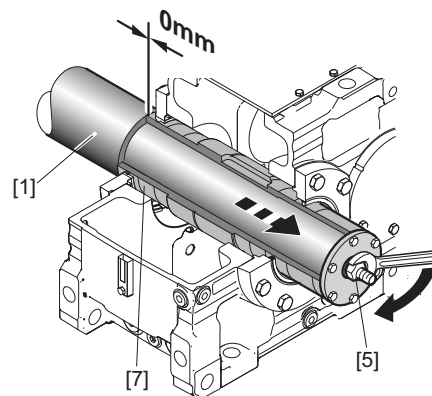
356508428

[1] Machine shaft
[2] Threaded rod

[3] Retaining screws
[4] End plate

[7] Hollow shaft

- Tighten the machine shaft [1] with the nut [5] until the shoulders of the machine shaft and the hollow shaft [7] meet.

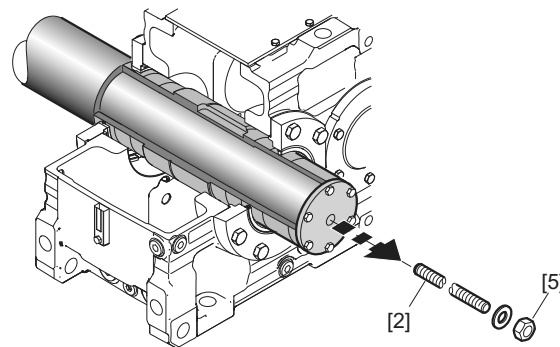


310501387

[1] Machine shaft
[5] Nut

[7] Hollow shaft

- Loosen the nut [5]. Screw the threaded rod [2] out.



310506251

[2] Threaded rod

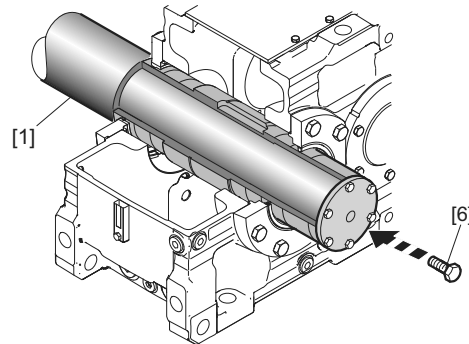
[5] Nut



Assembly/Installation

Gear unit with hollow shaft and shrink disc

5. Secure the machine shaft [1] with the retaining screw [6] (see section 5.2 for tightening torques). The retaining screw should also be locked with a suitable thread-locker.



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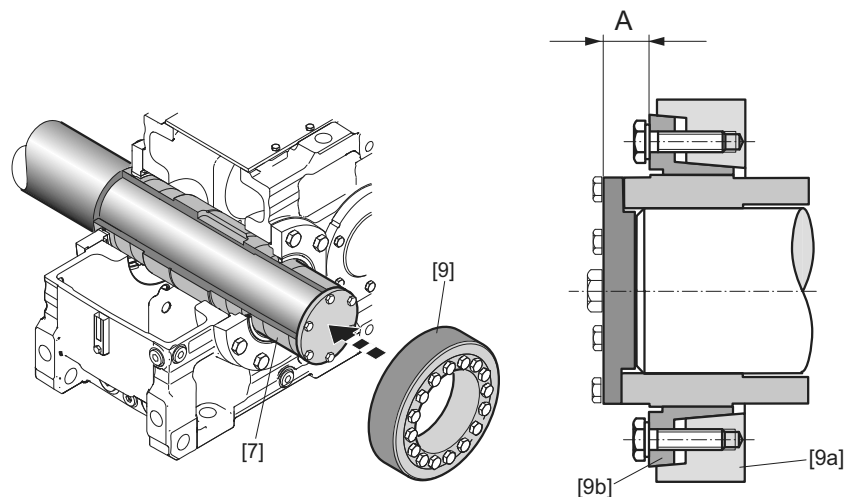
- [1] Machine shaft
[6] Retaining screw



Do not disassemble the shrink disc before the first installation.

Do not tighten the retaining screws unless the machine shaft is installed – the hollow shaft could be deformed.

6. Slide the shrink disc [9] with untightened screws onto the hollow shaft [7] and position the inner ring of the shrink disc [9b] with measurement A.



449699468

- [7] Hollow shaft
[9] Shrink disc
[9a] Bevel (outer ring)
[9b] Taper bushing (inner ring)

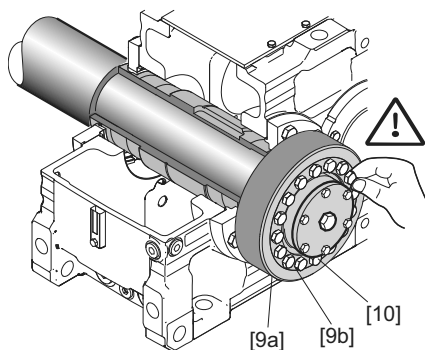
Gear unit size	Dimension A [mm (in)]
XH180–190	37 (1.46)
XH200–210	38 (1.50)
XH220–230	39 (1.53)
XH240–250	48 (1.89)



7. Tighten the retaining screws [10] hand-tight. In doing so, align the bevel (outer ring) [9a] parallel to the taper bushing (inner ring) [9b]. Successively tighten the retaining screws [10] in a clockwise direction (not in a diametrically opposite sequence), each with a quarter turn. Do not tighten the retaining screws [10] in a diametrically opposite sequence.



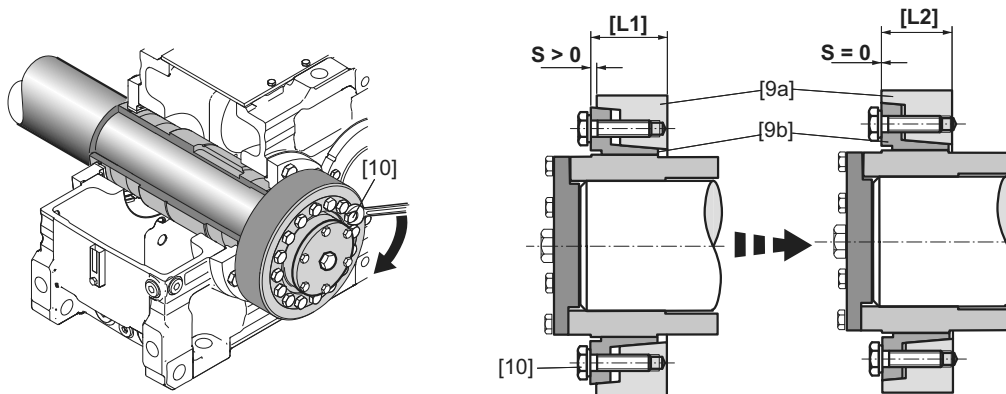
For shrink discs with a slotted taper bushing (inner ring) [9b], tighten the retaining screws [10] to the left and right of the slot one after another, and then, in several stages, tighten the remaining screws at evenly spaced intervals.



[9a] Bevel (outer ring)
[9b] Taper bushing (inner ring)

[10] Retaining screws

8. Working around the ring in several stages, evenly tighten the retaining screws [10] by quarter turns until the bevel (outer ring) [9a] and the taper bushing (inner ring) [9b] align on the face that holds the screws as is shown in the illustration below.



[L1] Condition at the time of shipment (preassembled)
[L2] Finished assembly (ready for operation)

[9a] Bevel (outer ring)
[9b] Taper bushing (inner ring)
[10] Retaining screws



If the bevel (outer ring) and the taper bushing (inner ring) cannot be aligned on the face that holds the screws, disassemble the shrink disc again and carefully clean/ lubricate it as is presented in the next section.



Be sure to properly attach the protection cover after completing assembly.



Assembly/Installation

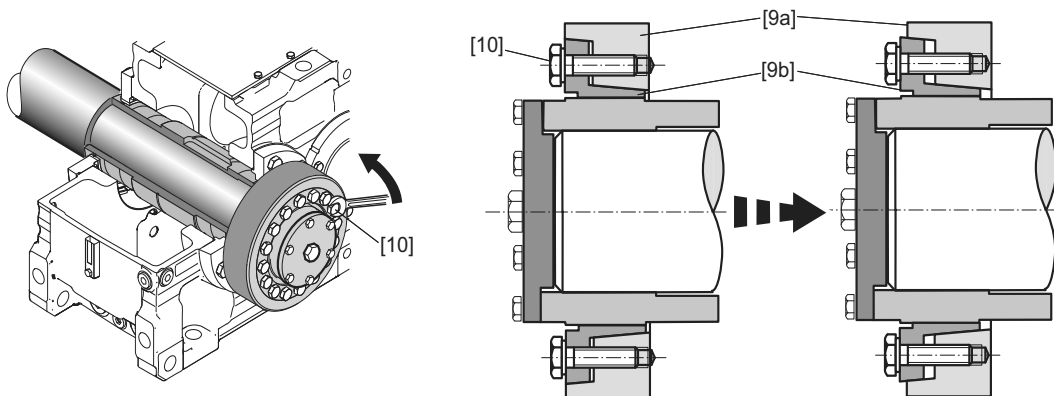
Gear unit with hollow shaft and shrink disc

5.10.5 Disassembling the gear unit from the machine shaft



Never completely unscrew the retaining screws because the shrink disc might jump off and cause an accident.

1. Loosen the locking screws [10] by a quarter turn one after the other to avoid straining the connecting surface.



419025426

[9a] Bevel (outer ring)
[9b] Taper bushing (inner ring)
[10] Retaining screws



If the bevel (outer ring) [9a] and the taper bushing (inner ring) [9b] do not separate by themselves:

Take the necessary number of retaining screws and screw them into the removal bores evenly. Tighten the retaining screws in several steps until the tapered bushing separates from the bevel ring.

2. Pull the shrink disc off of the hollow shaft. Disassemble the gear unit from the machine shaft as is described in section 5.9.5.



Only use the hollow shaft for bracing during disassembly. Bracing against other gear unit parts may cause damage.

Before re-assembly, the shrink disc must be cleaned and lubricated as described in the following section.



*Cleaning and
lubricating the
shrink disc*



You must perform the following steps carefully in order to ensure that the shrink disc functions perfectly. Use only products that are comparable to the lubricants that are given.

Clean the shrink disc after removal and:

1. Lubricate the retaining screw [10] on the threads and under the head with an MoS₂ compound, e.g. "gleitmo 100" from FUCHS LUBRITECH (www.fuchs-lubritech.de).
2. Apply a thin layer (0.01 ... 0.02 mm [0.0004 ... 0.0008 in]) of "gleitmo 900" lubricant from FUCHS LUBRITECH (www.fuchs-lubritech.de) or a comparable product from another manufacturer to the face of the bevel and surface that holds the screws on the taper bushing.



The necessary layer thickness of approx. 0.01 ... 0.02 mm (0.0004 ... 0.0008 in) is achieved when the lubricant covers the surface.

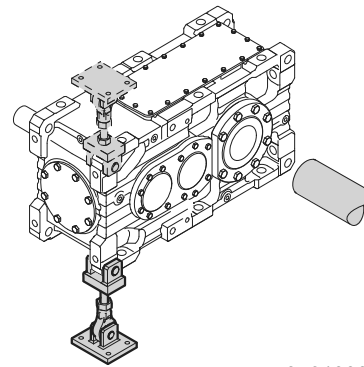
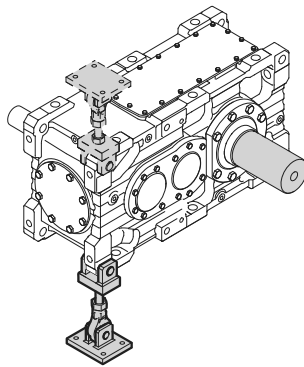


5.11 Torque arm



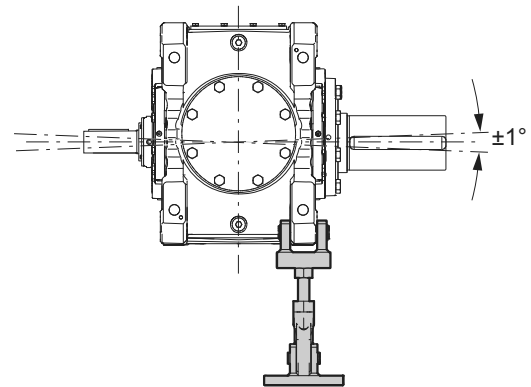
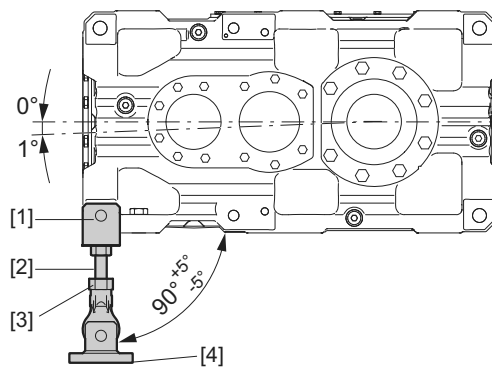
Do not deform the torque arm during installation. Deformation leads to constraining forces on the output shaft, which may negatively influence the service life of the output shaft bearings.

1. To keep the flexural torque on the machine shaft as low as possible, the torque arm must always be mounted on the same side as the machine that is driven. The torque arm can be mounted on the top or bottom of the gear unit.



359130891

2. Align the gear unit horizontally over the threaded bolts and the nuts of the torque arm.



449931788

- [1] Joint head with bolt
- [2] Threaded bolt with nuts
- [3] Joint head
- [4] Fork plate with bolt



5.12 Motor adapter

5.12.1 Maximum motor weight depending on gear unit



When selecting a motor, observe the permitted motor weight, the gear unit version and the type of gear unit mounting according to the following tables:



The table only applies to stationary applications. For mobile applications (e.g. travel drives), consult SEW-EURODRIVE.

Mounting type	Series/gear unit version	
	X.F..	X.K..
Foot-mounted version	$W_M \leq W_G$	$W_M \leq W_G$
Shaft mounted version	$W_M \leq 0.5 W_G$	$W_M \leq W_G$
Flange-mounted version	$W_M \leq 0.5 W_G$	$W_M \leq W_G$

The following applies to all tables:

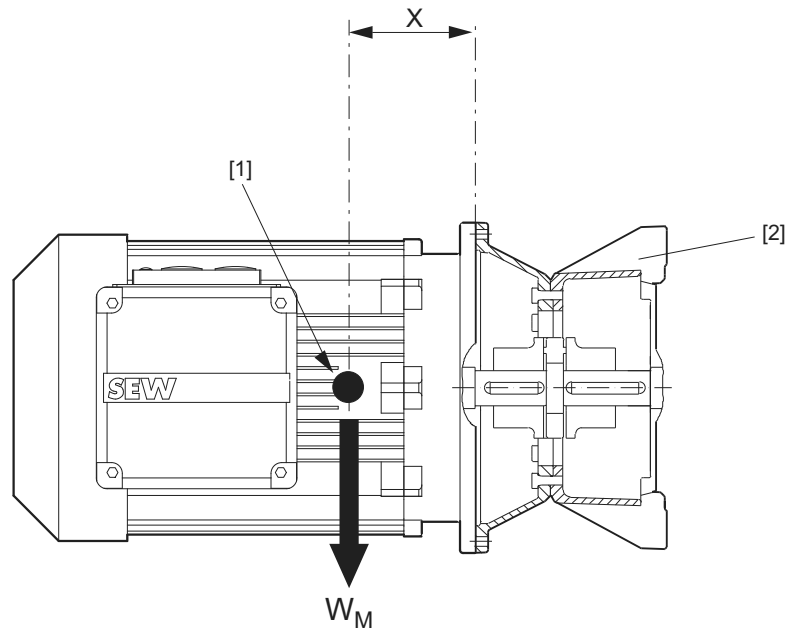
W_M = Motor weight

W_G = Gear unit weight



5.12.2 Maximum motor weight depending on the adapter size

In addition to the maximum motor weights depending on the gear unit described in section 5.12.1, the following maximum loads on the motor adapter may not be exceeded.



356535436

[1] Center of gravity of the motor

[2] Motor adapter

X = Distance from the center of gravity

W_M = Weight of the motor that is mounted

Motor adapter		W_M	X
IEC	NEMA	[N (lb)]	[mm (in)]
100/112	182/184	600 (135)	190 (7.48)
132	213/215	1100 (247.3)	230 (9.06)
160/180	254/286	2200 (494.6)	310 (12.2)
200	324	2800 (629.5)	340 (13.4)
225	326	4000 (899.2)	420 (16.5)
225/280	364 – 405	8200 (1843)	480 (18.9)
315S-L	444 – 449	14,500 (3259)	680 (26.8)
315		20,000 (4496)	740 (29.1)
355		25,000 (5620.2)	740 (29.1)

The maximum permitted weight of the attached motor (W_M) must be linearly reduced if the distance from the center of gravity distance X is increased. $W_{M \max}$ cannot be increased if the distance from the center of gravity is reduced.



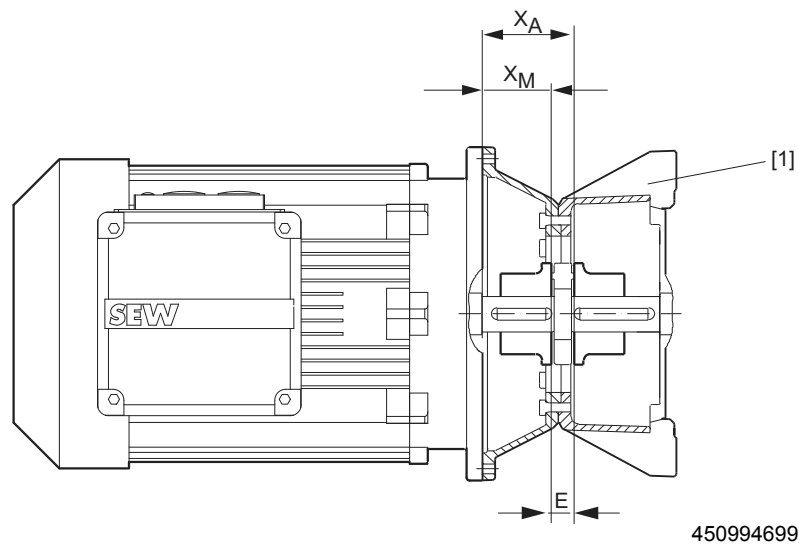
5.12.3 Attaching the motor to the motor adapter

1. Clean the motor shaft and flange surfaces of the motor and the motor adapter.



To avoid contact corrosion, we recommend applying NOCO® fluid to the motor shaft before mounting the coupling halves.

2. Push the coupling half onto the motor shaft and position it. When doing this, observe the information in section 5.8.2 and the illustration below. The coupling size and type are indicated on the coupling.



[1] Motor adapter

E = Mounting dimension

X_A = Distance between the coupling and the motor adapter flange surface

X_M = Distance between the coupling and the motor flange surface

$$\rightarrow X_M = X_A - E$$

3. Secure the coupling halves using the setscrew.
4. Install the motor onto the adapter, making sure that the claws of the coupling engage each other.

**5.13 Base plate**

It is essential that:

- The support structure of the foot mounting is adequately dimensioned and rigid,
- The base plate is only bolted onto the gear unit foundation at the mounting hole positions that are provided for that purpose. That the base frame is not deformed (hazard of damage to gear unit and coupling),
- That the base frame is not deformed through incorrect alignment of the gear unit output shaft to the machine shaft.

5.14 Swing base

It is essential that:

- The system frame is sufficiently dimensioned to absorb the torque of the torque arm.
- The swing base is not deformed during installation (hazard of damage to gear unit and coupling).

5.15 Fan

- When protective devices for couplings or similar are installed on gear units equipped with a fan, sufficient separation distance for the cooling air intake must be provided.
- See the dimension drawing in the catalog or the order documents for the required distance.
- Protect the fan guard from external damage.
- Never operate the gear unit without the protective housing.
- Make sure that the fan air intake vents are not blocked or covered.



5.16 Water cooling cover



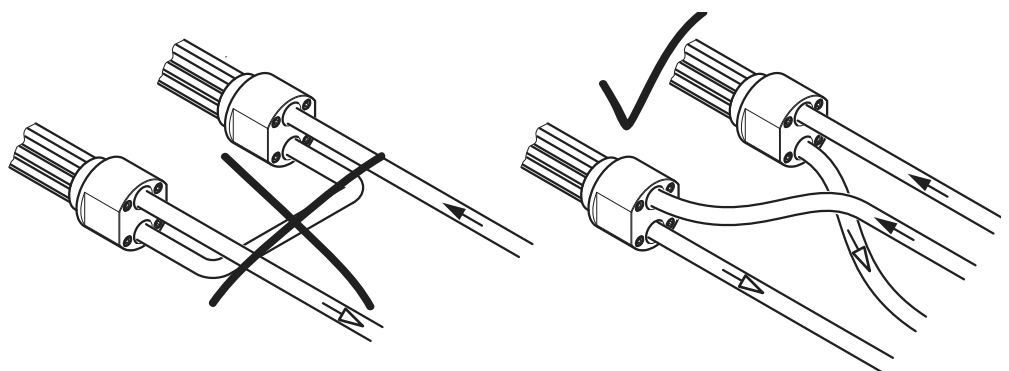
- Connect the water cooling cover to the available cooling circuit.
- Refer to section 5.18.3 to determine the permitted cooling media.
- The direction of flow does not matter.
- Cooling water temperature max. 15 °C (59 °F); Volume flow minimum 4 l/min (1.06 US gal./min) → according to order documents.
- The cooling water pressure may not exceed 6 bar (87 psi).
- In case of freezing temperatures or longer downtimes, the cooling water should be drained out of the cooling circuit. Any residual amounts should be removed with compressed air.

5.17 Water cooling cartridge



- Connect the water cooling cartridge to the available cooling circuit.
- Refer to section 5.18.3 to determine the permitted cooling media.
- The direction of flow does not matter.
- Cooling water temperature max. 15 °C (59 °F); Volume flow minimum 4 l/min (1.06 US gal./min) → according to order documents.
- The cooling water pressure may not exceed 6 bar (87 psi).
- In case of freezing temperatures or longer downtimes, the cooling water should be drained out of the cooling circuit. Any residual amounts should be removed with compressed air.
- The cooling circuit must be connected in parallel for gear units with two water cooling cartridges.

Connect two water cooling cartridges as shown below:



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- ← Inflow (cold water intake)
- Return (warm water discharge)



Assembly/Installation

Oil-water cooler with motor pump (only circulation cooling)

5.18 Oil-water cooler with motor pump (only circulation cooling)

5.18.1 Mechanical connection

Observing local regulations, connect the heat exchanger to the cooling circuit according to the identifying markings. Avoid reducing the indicated pipe cross section when doing this.

Do not use tin-coated screw fitting pieces; it is preferable that you use screw fittings with composite material seals.

5.18.2 Electrical connection

Make the electrical connections for the pump and the temperature switch according to local regulations.

Ensure that the pump rotates in the correct direction when making the connection.

The temperature switch should be integrated into the circuit in such a manner that:

- The motor pump of the oil-water cooler is switched on at the first switching point (at 40 °C [104 °F] oil temperature).
- Either a warning signal is activated or the main drive is switched off at the second switching point (at 90 °C [194 °F] oil temperature).

5.18.3 Cooling media



Special procedures are required when sea and brackish water are used. Please contact SEW-EURODRIVE.



Note that the service life, the efficiency, and the maintenance intervals of the heat exchanger depend to a great degree on the quality and contents of the cooling medium.

Permitted cooling media

- Water, water/glycol cooling liquids, HFC refrigerants
- Cooling water temperature 20 °C (68 °F); same volume flow of oil and cooling water

Dirt

The quantity of suspended solids (ball-shaped, particle size < 0.6 mm [0.02 in]) should be less than 10 mg/l (0.0013 oz/US gal.). Threadlike contaminants increase the risk of pressure loss.

Corrosion

Limit values: free chlorine < 0.5 ppm, chlorine ions < 200 ppm, sulfate < 100 ppm, ammonia < 10 ppm, free CO < 10 ppm, pH 7–10.

The following ions do not have a corrosive effect under normal conditions: phosphate, nitrate, nitrite, iron, manganese, sodium, potassium.



Also, observe the additional manufacturer's documentation.



5.19 Oil heater



In order to prevent damage, it is essential that the heating elements are fully immersed in the oil bath.



The position of the thermostat and the temperature sensor varies with gear unit design and mounting position of the gear unit.

5.19.1 Connection power

The table below shows the power of the heaters that may be installed.

Size	Gear unit Version	P _{inst} 1 Heater		P _{inst} 2 Heaters	
		[kW]	[K/h]	[kW]	[K/h]
180	X2F., X3K., X3F., X4K..	1 x 1.6	4.2	2 x 1.6	14
	X4F..	1 x 1.1	2.9	2 x 1.1	9
190	X2F., X3K., X3F., X4K..	1 x 1.6	4.1	–	–
	X4F..	1 x 1.1	2.8	–	–
200	X2F., X3K., X3F., X4K..	1 x 1.9	4.0	2 x 1.9	13
	X4F..	1 x 1.3	2.7	2 x 1.3	9
210	X2F., X3K., X3F., X4K..	1 x 1.9	3.9	–	–
	X4F..	1 x 1.3	2.6	–	–
220	X2F., X3F., X4F., X3K., X4K..	1 x 2.25	3.7	2 x 2.25	12
230	X2F., X3F., X4F., X3K., X4K..	1 x 2.25	3.7	–	–
240	X2F., X3F., X4F., X3K., X4K..	1 x 2.25	3.1	2 x 2.25	9
250	X2F., X3F., X4F., X3K., X4K..	1 x 2.6	3.6	–	–

K/h = Heating power [kelvins/hour]

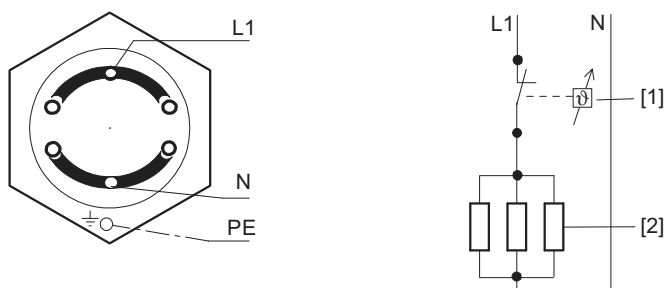
P_{inst} = Power of the installed heater



5.19.2 Electrical connection resistor element

Examples

- AC, single-phase, AC 230 V – parallel connection

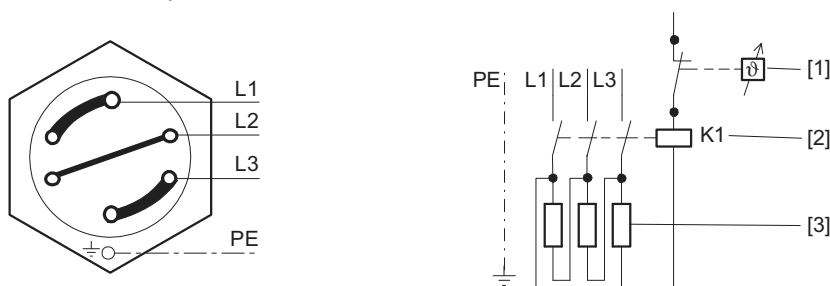


[1] Thermostat

[2] Heater

Mains voltage	Phase voltage	Resistor element voltage
400 V	230 V	230 V

- AC, three-phase, 3 x AC 400 V – delta connection



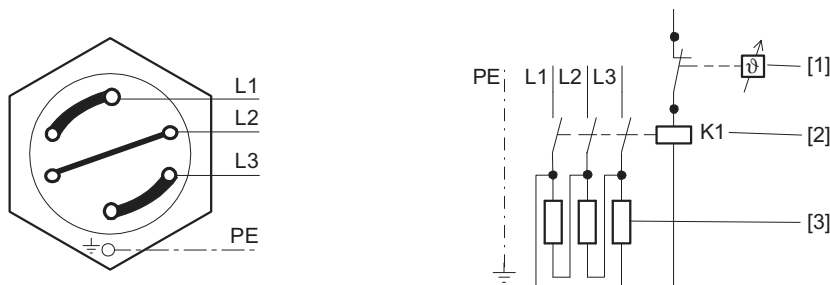
[1] Thermostat

[2] Contactor on-site

[3] Heater

Mains voltage	Phase voltage	Resistor element voltage
400 V	400 V	230 V

- AC, three-phase, AC 230 / 400 V – star connection



[1] Thermostat

[2] Contactor on-site

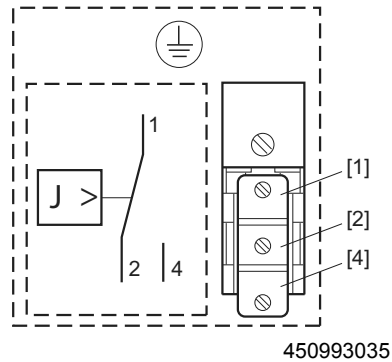
[3] Heater

Mains voltage	Phase voltage	Resistor element voltage
400 V	400 V	230 V



5.19.3 Thermostat

Electrical connection



- Connect to terminals (1, 2 and 4) per wiring diagram
- Connect the protective earth to terminal "PE"



Follow the manufacturer's safety instructions

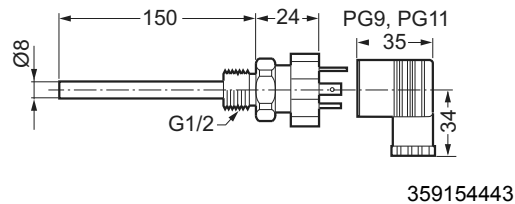
Technical data

- Ambient temperature: $-40\text{ }^{\circ}\text{C}$ to $+80\text{ }^{\circ}\text{C}$ ($-40\text{ }^{\circ}\text{F}$ to $+176\text{ }^{\circ}\text{F}$)
- Scale range: $-20\text{ }^{\circ}\text{C}$ to $+100\text{ }^{\circ}\text{C}$ ($-4\text{ }^{\circ}\text{F}$ to $+212\text{ }^{\circ}\text{F}$)
- Max. switching power:
AC 230 V +10 %, 10 A
DC 230 V +10 %, 0.25 A
- Cable entry: M20x1.5 for cable diameter 5 to 10 mm (0.2 to 0.4 in)
- Enclosure IP65 according to EN 60529

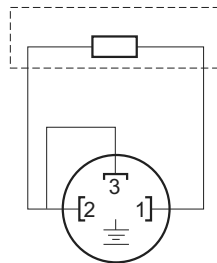


5.20 Temperature sensor PT100

5.20.1 Dimensions



5.20.2 Electrical connection



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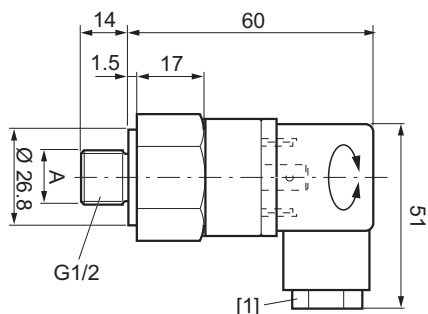
5.20.3 Technical data

- Sensor tolerance [K] $\pm (0.3 + 0.005 \times T)$, (corresponds to DIN IEC 751 class B),
T = Oil temperature [°C]
- Plug connector: DIN 43650 PG9 (IP65)
- The tightening torque for the retaining screw in the back of the plug connector for electrical connection = 0.25 Nm (2.2 in·lb).



5.21 NTB temperature switch

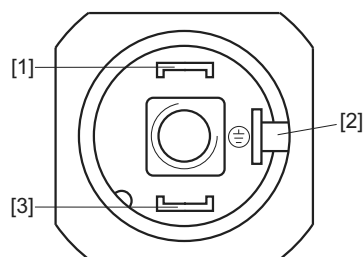
5.21.1 Dimensions



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5.21.2 Electrical connection

To guarantee a long service life and trouble-free functioning, we recommend that you use a relay in the power circuit instead of a direct connection through the temperature switch.



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- [1] NC contact (without vacuum)
- [2] Grounding terminal 6.3 x 0.8
- [3] NO contact (without vacuum)

5.21.3 Technical data

- Trigger temperature: 70 °C, 80 °C, 90 °C, 100 °C $\pm$ 5 °C (158 °F, 176 °F, 194 °F, 212 °F $\pm$ 9 °F)
- Contact capacity: 10 A, AC 240 V
- Plug connector: DIN 43650 PG09 (IP65)
- The tightening torque for the retaining screw in the back of the plug connector for the electrical connection is 0.25 Nm (2.2 in·lb).

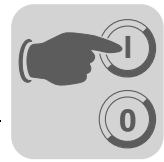


6 Startup

6.1 Notes on startup



- Strictly observe the safety notes in the individual sections.
- Observe section 5.5 "Preliminary work".
- The most important technical data is included on the nameplate. Additional data relevant for operation is available in drawings, order confirmations or any order-specific documentation.
- Ensure that the unit is not started up in a potentially explosive atmosphere.
- Before startup, check that the oil level is correct. Refer to the unit's nameplate for the lubricant volumes.
- It is essential that there is no open fire or risk of sparks when working on the gear unit.
- After the gear unit has been installed, ensure that all retaining screws are tight.
- After tightening the mounting elements, check to ensure that the alignment has not changed.
- Ensure that rotating shafts as well as couplings are equipped with suitable protective covers. Contact with rotating parts is not permitted.
- If there are any oil drain valves, ensure that they cannot be opened unintentionally.
- If you use an oil level glass to monitor the oil level, protect it from possible damage.
- Protect the gear unit from falling objects.
- If the gear unit is equipped with a fan on the input shaft, check for free air intake within the specified angle.
- For gear units with long-term protection: Replace the screw plug at the location indicated on the gear unit with a breather plug (position → see order documents).
- Be sure that the external coolant supply is guaranteed for gear units with circulation cooling, water cooling covers and water cooling cartridges.
- When operated in areas with low ambient temperatures, be sure that the gear unit is not below the limit temperature given in section 6.4 upon startup. Allow for sufficient warm-up time.



6.2 Run-in period

SEW-EURODRIVE recommends running-in the gear unit as the first phase of startup. Increase the load and speed of revolutions in two to three steps up to the maximum level. The running-in phase takes approx. 10 hours.

Check the following points during the run-in phase:

- Verify the power values specified on the nameplate at startup because their level and frequency may be a decisive factor for the service life of the gear unit.
- Does the gear unit run smoothly?
- Are there vibrations or unusual running noises?
- Are there signs of leakage (lubricants) on the gear unit?
- Check to be sure that the additional devices (such as oil pump, cooler, etc.) are functioning properly.



For further information and troubleshooting measures, refer to the "Malfunctions" section.

6.3 Gear units with backstop

The purpose of a backstop is to prevent undesirable reverse rotation. During operation, the backstop permits rotation in only one specified direction of rotation.

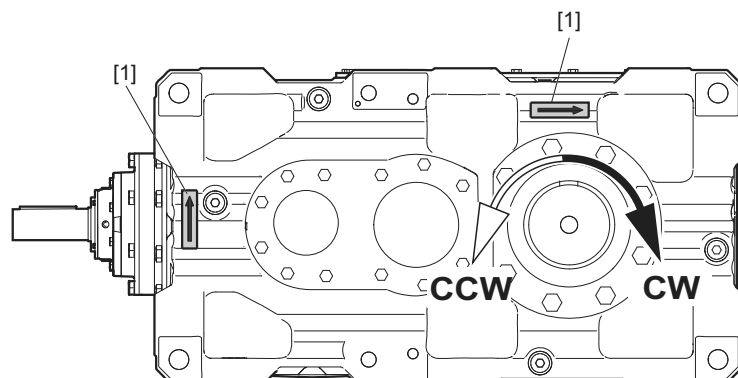


- **Do not start up the motor in the direction that is blocked. Be sure that the motor power supply is correctly attached so that the motor rotates in the required direction. Operating the motor in the direction that is blocked could destroy the backstop.**
- **Consult SEW-EURODRIVE if you want to change the blocking direction.**

The direction of rotation is determined with a view to the output shaft (LSS).

- Clockwise (CW)
- Counterclockwise (CCW)

The permitted direction of rotation [1] is indicated on the housing.



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Startup

Starting up the gear unit at low ambient temperatures

6.4 Starting up the gear unit at low ambient temperatures

The minimum permissible ambient temperature for gear unit startup depends on the pour point of the oil that is used.



Before startup, the oil must be heated up to the temperature specified under "Without heater" (pour point).

The table below shows the limit temperatures for gear unit startup (with and without heater).

6.4.1 Mineral oil

Gear unit	Version	ISO VG320	ISO VG220	ISO VG150
XF180 – XF250	Without heater (pour point)	–10 °C (14 °F)	–15 °C (5 °F)	–20 °C (–4 °F)
	With heater (1 heater)	–28 °C (–18 °F)	–33 °C (–27 °F)	–40 °C (–40 °F)
	With heater (2 heaters)	–40 °C (–40 °F)	–40 °C (–40 °F)	–40 °C (–40 °F)

6.4.2 Synthetic oil

Gear unit	Version	ISO VG320	ISO VG220	ISO VG150
XF180 – XF250	Without heater (pour point)	–35 °C (–31 °F)	–40 °C (–40 °F)	–40 °C (–40 °F)
	With heater (1 heater or 2 heaters)	–40 °C (–40 °F)	–40 °C (–40 °F)	–40 °C (–40 °F)



The temperatures specified refer to the average values of the permitted lubricants based on the lubricant table (see section 9.2). In borderline cases, the permitted temperature of the lubricant that is actually being used must be verified. When planning the motor, observe the increased starting torque at low temperatures. It may be necessary to contact SEW-EURODRIVE.

6.4.3 Operating notes

- The oil heater's thermostat is factory-set at the respective limit temperature.
- The oil heater turns off when the set temperature is exceeded by 8 K to 10 K.
- The thermostat and oil heater are installed on the gear unit and ready for operation, but they must be connected to the external power supply before startup.
- Contact SEW-EURODRIVE if a differing oil viscosity class is used or if ambient temperatures fall below the identified limit temperature.
- Depending on the switching point, the resistor element may be controlled directly or through a contactor. When connected in parallel, the switching power of the thermostat must be considered.



6.5 Shutting down gear units



Switch off the gear unit's drive unit.

Prevent the drive unit from starting up unintentionally (for example, by locking the keyswitch or removing the fuses from the power supply). Place an information sign on the ON switch to warn that the gear unit is being worked on.



When working on gear units with a cooling coil or an oil-water cooler, close the cooling water inflow and return shutoff valves. Drain the water from the cooling coil or the oil-water cooler.

If the gear unit will not be operated for an extended period of time, you must activate it regularly at intervals of approx. 2 – 3 weeks.

If the gear unit will not be operated for a period **longer than nine months**, additional corrosion protection is required:

- **Internal corrosion protection:**

- Fill the gear unit up to the breather plug with the oil grade specified on the nameplate.
- Set the gear unit in no-load running operation for a short period of time at regular intervals.



If this method of corrosion protection is not possible, the interior of the gear unit should be sealed and protected with a suitable corrosion protectant. Consult with the respective supplier regarding the compatibility with the oil that is used and the length of corrosion protection for your particular gear unit version.

- **Exterior corrosion protection:**

- Clean the surfaces.
- Grease the shaft near the sealing lip to separate the sealing lip of the oil seal and the corrosion protectant.
- Apply a wax-based protective coating to shaft ends and unpainted surfaces as external corrosion protection.



Observe the notes in section 2.6.4.



Refer to the "Startup" section before re-starting the gear unit.



7 Inspection and Maintenance

7.1 Notes regarding inspection and maintenance



- Strictly observe the safety notes in the individual sections.
- Strict adherence to the inspection and maintenance intervals is absolutely necessary to ensure safe working conditions.
- Observe the startup torques in section 5.2.
- Work on the gear unit and additional equipment only when the machine is not in use. Prevent the drive unit from starting up unintentionally (for example by locking the keyswitch or removing the fuses from the power supply). Place an information sign on the ON switch to warn that the gear unit is being worked on.
- When using primary gearmotors, also observe the maintenance notes for motors and primary gear units in the accompanying operating instructions.
- Use only OEM spare parts according to the delivered spare and wearing parts lists.
- Before releasing shaft connections, be sure that there are no active torsional moments present (tensions within the system).
- If you remove the gear unit cover, you must apply new sealing compound to the sealing surface. Otherwise, the sealing properties of the gear unit might be impaired. Contact SEW-EURODRIVE in this case.
- Prevent foreign bodies from entering into the gear unit during the following work.
- Do not clean the gear unit with a high-pressure cleaning system. If one is used, water may enter into the gear unit and the seals may be damaged.
- Perform safety and function tests following all maintenance and repair work.



Danger of burns

Touching the gear unit when it has not yet cooled off may result in burns.

Never touch the gear unit during operation or during the cool down phase after it has been switched off.



7.2 Inspection and maintenance periods

Time interval	What to do?
Daily	- Check the housing temperature: - With mineral oil: max. 90 °C (194 °F) - With synthetic oil: max. 100 °C (212 °F) - Check gear unit noise
Monthly	- Check gear unit for signs of leakage - Check the oil level (section 7.4)
After 500 hours of operation	First oil change after initial startup (section 7.6)
Every 3,000 operating hours, at least every 6 months	- Check the oil consistency (section 7.5) - Fill regreasable sealing systems with grease (see section 7.8)
Depending on the operating conditions, at least every 12 months	- Check whether retaining screws are tightly secured - Check the condition of the oil-water cooling system - Clean oil filter, replace filter element if necessary
At least every 3 years, depending on the operating conditions (see figure on next page)	Change mineral oil
At least every 5 years, depending on the operating conditions (see figure on next page)	Change synthetic oil
Varies (depending on external factors)	- Check the breather plug, replace if needed (section 7.7) - Clean the external gear unit housing and fan - Check the alignment of the input and output shaft (section 5.7) - Repair or renew the surface/anticorrosion coating - Check built-in coolers (such as water cooling covers/cartridges) for deposits (sections 7.10/7.11) - Check oil heating (at same time as oil change) - Are all connection cables and terminals tightened securely and free from corrosion? - Clean encrusted heating elements, replace if needed (section 7.12)

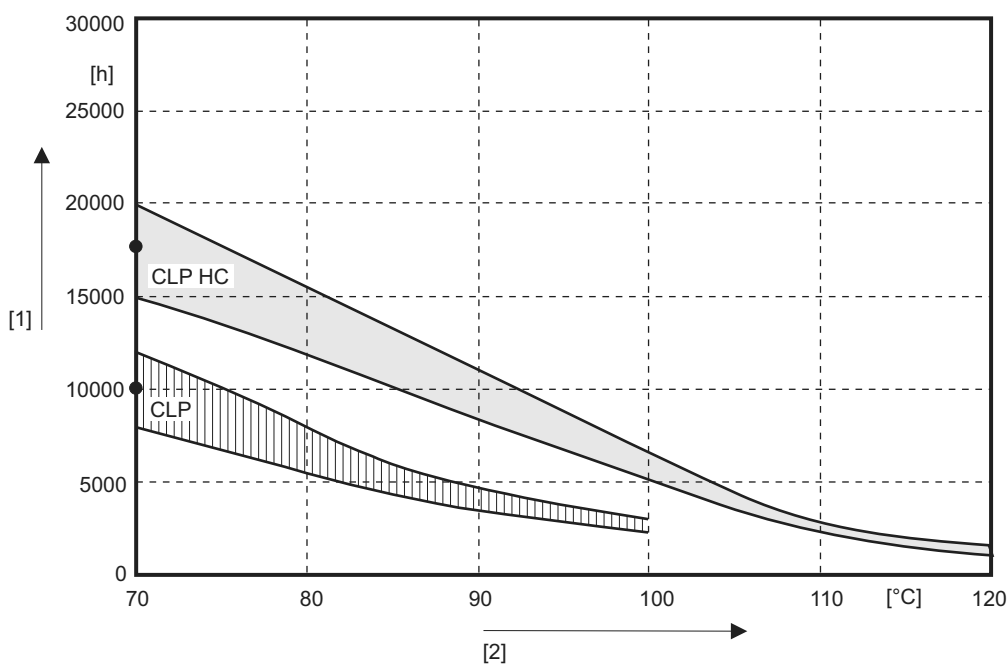


7.3 Lubricant change intervals

Change the oil more frequently when using special designs subject to more severe/aggressive ambient conditions.



Mineral CLP lubricants and synthetic polyalphaolefin-based (PAO) lubricants are used for lubrication. The synthetic lubricant CLP HC (according to DIN 51502) shown in the following illustration corresponds to the PAO oils.



[1] Operating hours

[2] Sustained oil bath temperature

● Average value per oil type at 70 °C (158 °F)



In order to optimize the oil change intervals, SEW-EURODRIVE recommends that the gear unit oil be analyzed regularly (see section 7.5).



7.4 Checking the oil level



- Do not mix different synthetic lubricants and do not mix synthetic with mineral lubricants.
- The position of the oil level plug, oil drain plug, and breather valve depends on the mounting position. Refer to the diagrams of the mounting positions.

1. Work on the gear unit only when the machine is not in use.
2. Secure the drive unit against unintentional power-up.



Wait until the gear unit has cooled off – Danger of burns!

3. For gear units with oil level glass:
 - Visually check that the oil level is correct (= centered between Min./Max. markings), correct if necessary (see following illustration).
 - When filling for the first time, the oil level must be checked once again after 15 minutes (equalization of level between gear unit interior and oil level glass).
4. For gear units with oil dipstick (optional):
 - Unscrew the oil dipstick and remove it.
 - Clean the oil dipstick and re-insert it by turning it hand-tight into the gear unit up to the stop.
 - Remove dipstick again and check oil level. Correct if necessary (= centered between Min./Max. markings):

Oil level glass	Oil dipstick	Oil sight glass
460483724	460483852	460483980

[1] The oil level should be within this range



7.5 Checking the oil consistency

1. Work on the gear unit only when the machine is not in use.
2. Secure the drive unit against unintentional power-up.



Wait until the gear unit has cooled off – Danger of burns!

3. Remove some oil at the oil drain plug.
4. Check the oil consistency:
 - For more detailed information on checking the oil for water content and viscosity, contact your lubricant manufacturer.
 - If you can see that the oil is heavily contaminated, change the oil even if this is outside of the specified oil change intervals.

7.6 Changing the oil

7.6.1 Notes



- When changing the oil, always refill the gear unit with the grade of oil that was used before. Mixing oils of different grades or manufacturer is not permitted. Especially synthetic oils may not be mixed with mineral oils or other synthetic oils. Flush the gear unit with the new oil grade thoroughly when switching from mineral oil or when switching from synthetic oil of one basis to synthetic oil of a different basis.
- Refer to the lubrication table in section 9.2 to determine which oils from the various lubricant manufacturers can be used.
- Information such as the oil grade, oil viscosity and required oil quantity is listed on the nameplate of the gear unit.
- The oil quantity specified on the nameplate is an approximate quantity. The markings on the oil level glass or dipstick are the decisive indicators for the quantity of oil used to fill the unit.
- Only change the oil when the gear unit is warm.
- When changing the oil, flush the housing thoroughly with oil to remove oil sludge, oil residue, and abrasion products. Use the same grade of oil that is used to operate the gear unit. Viscous oil must first be heated up. Fill with fresh oil only after all residues have been removed.
- The position of the oil level and oil drain plug and the breather valve depends on the mounting position. Refer to the diagrams of the mounting positions.
- The used oil must be collected and recycled according to the applicable regulations.



7.6.2 Procedure

1. Work on the gear unit only when the machine is not in use.
2. Secure the drive unit against unintentional power-up.



Wait until the gear unit has cooled off – Danger of burns!

The gear unit must still be warm, otherwise the high viscosity of excessively cold oil will make it more difficult to drain the oil correctly.

3. Place a container underneath the oil drain plug.
4. Remove the oil fill plug and the oil drain plug.
5. Drain all the oil.



When changing the oil, clean the gear unit housing thoroughly to remove oil residues and abrasion. Use the same oil grade as for the operation of the gear unit.

6. Re-insert the oil drain plug.
7. Fill new oil of the same type as the old oil via the oil filling plug (if you want to change the oil type, contact our customer service first).
 - Use a funnel to fill the oil (filter mesh max. 25 µm [0.00098 in]).
 - Fill the oil according to the quantity specified on the nameplate (→ "Nameplate" section). The oil quantity specified on the nameplate is an approximate value.
 - Check whether the oil level is correct using the oil level glass or the oil dipstick.
8. Clean the oil filter, replace the filter element if necessary (when using an external oil/air or oil-water cooling system).



Any dripping oil must be removed immediately with an oil binding agent.



Inspection and Maintenance

Checking and cleaning the breather plug

7.7 Checking and cleaning the breather plug



Prevent foreign bodies from entering into the gear unit during the following work.

1. Remove any deposits located near the breather plugs.
2. Replace clogged breather plugs with new ones.

7.8 Refilling grease

Regreasable sealing systems may be refilled with lithium-soap grease (see section 9.3). Using moderate pressure, force approx. 30 g (1.1 oz) grease into each lubrication point. Used grease, including contaminants and sand, is thus pressed out of the sealing gap.



Used grease that has oozed out must be removed immediately and properly disposed of.

7.9 Fan

Check the fan's inlets and outlets regularly. The opening must be kept clear; clean the fan guard if necessary.



Before restarting the fan, be sure the fan guard is mounted properly. The fan may not rub against the fan guard.



7.10 Water cooling cover



Wait until the gear unit has cooled off – Danger of burns!

1. Remove the cooling water inflow and return lines from the water cooling cover.
2. Check the water cooling cover for deposits.

Light dirt on the water cooling cover should be cleaned off using an appropriate cleaning agent. This should be replaced with a new one if it is heavily soiled. Consult SEW-EURODRIVE.

3. Re-connect the water cooling inflow and return lines to the water cooling cover.

7.11 Water cooling cartridge



Wait until the gear unit has cooled off – Danger of burns!

1. Remove the cooling water inflow and return lines from the water cooling cartridge.
2. Before disassembly, drain the oil completely (see section 7.6).
3. Check the water cooling cartridges for deposits.

Lightly soiled water cooling cartridges should be cleaned using an appropriate cleaning agent, if necessary. These should be replaced with new ones if they are heavily soiled. Consult SEW-EURODRIVE.

4. Re-connect the water cooling inflow and return lines to the water cooling cartridges.



7.12 Oil heater

Remove any encrusted oil from the oil heater. Remove the oil heater to clean it.

1. Work on the gear unit only when the machine is not in use.
2. Secure the drive unit against unintentional power-up.



Wait until the gear unit has cooled off – Danger of burns!

3. Before disassembling the oil heater, drain the oil completely (see section 7.6).
4. Remove the oil heater.
5. Clean the tubular heating elements with solvent, replace defective heating elements.



Ensure that there is sufficient ventilation when using solvents. There is a risk of explosion. No open flames.



- Do not let the solvent come into contact with the sealing lips of the oil seals.
- Be careful not to damage the heating elements through scratching or scraping!

6. Re-install the oil heater.

7.13 Split housing

If the split gear unit housing is divided during maintenance, be sure that:

- the parting lines are sealed again carefully, and
- the screw connections are re-tightened using the tightening torques given in section 5.2.



8 Malfunctions

8.1 Notes regarding gear unit malfunctions



- Strictly observe the safety notes in the individual sections.
- When eliminating malfunctions, the gear unit and additional equipment must be deactivated. Prevent the drive unit from starting up unintentionally (for example, by locking the keyswitch or removing the fuses from the power supply). Place an information sign on the ON switch to warn that the gear unit is being worked on.



Danger of burns

Touching the gear unit when it has not yet cooled off may result in burns.

Never touch the gear unit during operation or during the cool down phase after it has been switched off.



Malfunctions that occur during the warranty period that require repair to the gear unit may only be resolved by SEW-EURODRIVE.

After the warranty period has elapsed, we recommend that our customers contact our customer service when malfunctions occur and their cause is not clear.

8.2 Customer service

Please have the following information available if you require customer service assistance:

- Complete nameplate data
- Type and extent of the problem
- Time the problem occurred and any accompanying circumstances
- Assumed cause
- A digital photograph if possible



8.3 Possible gear unit malfunctions

Problem	Possible cause	Remedy
Unusual, regular running noise	- Meshing/grinding noise: Bearing damage - Knocking noise: Irregularity in the gearing - Deformation of the housing upon tightening - Noise generation caused by insufficient rigidity of the gear unit foundation	- Check the oil (→ "Inspection and Maintenance" section), replace bearings - Contact customer service - Check the gear unit mounting for possible deformation and correct if needed - Reinforce the gear unit foundation
Unusual, irregular running noise	Foreign bodies in the oil	- Check the oil (see section "Inspection and Maintenance") - Stop the drive, contact customer service
Unusual noise in the area of the gear unit mounting	Gear unit mounting has loosened	- Tighten retaining screws and nuts to the specified torque - Replace the damaged/defective retaining screws or nuts
Operating temperature too high	- Too much oil - Oil too old - The oil is heavily contaminated - Ambient temperature is too high - Gear units with fan: Air intake opening/gear unit housing very dirty - For gear units with built-in cooling: - Cooling liquid flow rate too low - Cooling liquid temperature too high - Deposits in the cooling system - Malfunctions of oil/air or oil-water cooling system	- Check the oil level, correct if necessary (→ "Inspection and Maintenance" section) - Check when the oil was last changed; change the oil if necessary (→ "Inspection and Maintenance" section) - Protect from external heat sources (e.g. provide shade) - Change the oil (→ "Inspection and Maintenance" section) - Check the air intake opening and clean if necessary, clean gear unit housing - Observe the separate operating instructions for the oil-water and oil/air cooling system
Bearing point temperatures too high	- Not enough oil - Oil too old - Bearing damaged	- Check the oil level, correct if necessary (→ "Inspection and Maintenance" section) - Check when the oil was last changed; change the oil if necessary (→ "Inspection and Maintenance" section) - Check bearing and replace if necessary, contact customer service
Operating temperature at backstop too high No blocking function	Damaged/defective backstop	- Check backstop; replace if necessary - Contact customer service
Oil leaking:¹⁾ - From cover plate - From gear unit cover plate - From bearing cover - From mounting flange - From drive/output side oil seal	- Gasket on cover plate/gear unit cover/bearing cover/mounting flange leaks - Sealing lip of the oil seal turned up - Oil seal damaged/worn	- Tighten the bolts on the respective cover plate and observe the gear unit. If oil still leaks: Contact customer service - Vent the gear unit, observe the gear unit. If oil still leaks: Contact customer service - Check shaft end ring; replace if necessary - Contact customer service
Oil leaking: - From oil drain plug - From breather plug	- Too much oil - Drive installed in incorrect mounting position - Frequent cold starts (oil foams) and/or high oil level	- Correct the oil volume (see "Inspection and Maintenance" section) - Mount the breather plug correctly and correct the oil level (see nameplate, "Lubricants" section)
Malfunctions of oil/air or oil-water cooling system		Observe the separate operating instructions for the oil-water and oil/air cooling system
Gear unit does not reach cold start temperature	- Oil heater incorrectly connected or defective - Heat dissipation too great due to unfavorable climactic conditions	- Check that oil heater is connected and functioning correctly, replace if needed - Protect the gear unit from cooling off during the warm-up phase

1) During the run-in phase (24-hour run time), it is normal for small amounts of oil/grease to leak from the oil seal (see also DIN 3761).



9 Lubricants

9.1 Selection of lubricants



- The oil viscosity and type (mineral/synthetic) that are to be used are determined by SEW-EURODRIVE specifically for each order. This information is noted in the order confirmation and on the gear unit's nameplate.
You must contact SEW-EURODRIVE in case of a deviation from this specification.
- Ensure that the gear unit is filled with the correct oil grade and quantity before startup. You can obtain the corresponding information from the gear unit nameplate and the lubricant table in the following section.
- The most important factors in selecting lubricants are the specified oil grade and viscosity found on the nameplate. The specified viscosity and oil grade are chosen for the operation conditions agreed upon in the contract. Any deviation from it makes consultation with SEW-EURODRIVE essential.
- This lubricant recommendation in no way represents a guarantee as to the quality of the lubricant delivered by each respective supplier. Each lubricant manufacturer is responsible for the quality of its product.
- Do not mix different synthetic lubricants and do not mix synthetic with mineral lubricants.



9.2 *Approved lubricants*

9.2.1 General

The lubricant table on the following page shows the permitted lubricants for gear units. Please refer to the following key for the lubricant table.

9.2.2 Key to the lubricant table

Abbreviations used, meaning of shading, and notes:

CLP = Mineral oil

CLP HC = Synthetic polyalphaolefin

	= Synthetic lubricant
	= Mineral lubricant

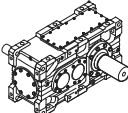
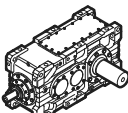
9.2.3 Notes on the lubricant table



- The temperature ranges are to be considered guide values. The decisive factor is the viscosity information on the nameplate.
- Contact SEW-EURODRIVE if you operate the unit under extreme conditions, such as cold, heat, or there are changes to the operating conditions since project planning.



9.2.4 Lubricant table

X.F..  X.K.. 											
 DIN (ISO)	ISO VG class	Mobil®									
CLP	VG 150			KLÜBER GEM 1-150N	Degol BG 150 Plus	BP Energol GR-XF 150	Meropa 150	Renolin CLP150Plus	Goya NT 150	Alpha SP 150 Alphamax 150 Optigear BM 150 Tribol 1100/150	
CLP HC	VG 150	Mobilgear SHC XMP150		Klüber GEM4-150N	Degol PAS 150	BP Enersyn EP-XF 150	Pinnacle WM 150	Renolin Unisyn CLP 150	ELGreco 150	Optigear Synthetic X 150 Tribol 1510/150 Tribol 1710/150	Carter SH 150
CLP	VG 220	Mobilgear XMP220	Shell Omala F220	KLÜBER GEM 1-220N	Degol BG 220 Plus	BP Energol GR-XF 220	Meropa 220	Renolin CLP 220 Plus	Goya NT 220	Alpha SP 220 Alphamax 220 Optigear BM 220 Tribol 1100/220	Carter EP 220
CLP HC	VG 220	Mobilgear SHC XMP220	Shell Omala Oil HD 220	Klüber GEM4-220N	Degol PAS 220	BP Enersyn EP-XF 220	Pinnacle WM 220	Renolin Unisyn CLP 220	ELGreco 220	Optigear Synthetic A 220 Optigear Synthetic X 220 Tribol 1510/220 Tribol 1710/220	Carter SH 220
CLP	VG 320	Mobilgear XMP320	Shell Omala F 320	KLÜBER GEM 1-320N	Degol BG 320 Plus	BP Energol GR-XF 320	Meropa 320	Renolin CLP 320 Plus	Goya NT 320	Alpha SP 320 Alphamax 320 Optigear BM 320 Tribol 1100/320	Carter EP 320
CLP HC	VG 320	Mobilgear SHC XMP320 Mobil SHC 632	Shell Omala Oil HD 320	Klüber GEM4-320N	Degol PAS 320	BP Enersyn EP-XF 320	Pinnacle EP 320	Renolin Unisyn CLP 320	ELGreco 320	Optigear Synthetic A 320 Optigear Synthetic X 320 Tribol 1510/ 320 Tribol 1710/ 320	Carter SH 320
CLP	VG 460	Mobilgear XMP460	Shell Omala F460	KLÜBER GEM 1-460N	Degol BG 460 Plus	BP Energol GR-XF 460	Meropa 460	Renolin CLP 460 Plus	Goya NT 460	Alphamax 460 Optigear BM 460 Tribol 1100/460	Carter EP 460
CLP HC	VG 460	Mobilgear SHC XMP460 Mobil SHC 634	Shell Omala Oil HD 460	Klüber GEM4-460N	Degol PAS 460	BP Enersyn EP -XF 460	Pinnacle WM 460	Renolin Unisyn CLP 460	ELGreco 460	Optigear Synthetic X 460 Tribol 1510/ 460 Tribol 1710/ 460	Carter SH 460
CLP	VG 680	Mobilgear XMP680		KLÜBER GEM 1-680N	Degol BG 680 Plus	BP Energol GR-XF 680	Meropa 680	Renolin CLP 680 Plus	Goya NT 680	Alpha SP 680 Optigear BM 680 Tribol 1100 / 680	Carter EP 680

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9.3 Lubricant fill quantities

The specified fill quantities are **guide values**. The precise values vary depending on the number of stages and gear ratios.

The markings on the oil level glass or dipstick are the decisive indicators for the quantity of oil used to fill the unit.

9.3.1 X.F..

X2F..	liter	X3F..	liter	X4F..	liter
X2F.180	74	X3F.180	77	X4F.180	70
X2F.190	75	X3F.190	77	X4F.190	71
X2F.200	102	X3F.200	104	X4F.200	96
X2F.210	102	X3F.210	104	X4F.210	96
X2F.220	137	X3F.220	143	X4F.220	141
X2F.230	137	X3F.230	143	X4F.230	141
X2F.240	165	X3F.240	176	X4F.240	175
X2F.250	170	X3F.250	176	X4F.250	175

9.3.2 X.K..

X3K..	liter	X4K..	liter
X3K.180	74	X4K.180	77
X3K.190	75	X4K.190	71
X3K.200	104	X4K.200	96
X3K.210	104	X4K.210	96
X3K.220	143	X4K.220	141
X3K.230	143	X4K.230	141
X3K.240	176	X4K.240	175
X3K.250	176	X4K.250	175



9.4 Sealing grease

The following overview shows the greases recommended by SEW-EURODRIVE.

Supplier	Sealing grease
Aral	Aralub HLP2
BP	Energrease LS-EPS
Castrol	Spheerol EPL2
Chevron	Dura-Lith EP2
Elf	Epexa EP2
Esso	Beacon EP2
Exxon	Beacon EP2
Gulf	Gulf crown Grease 2
Klüber	Centoplex EP2
Kuwait	Q8 Rembrandt EP2
Mobil	Mobilux EP2
Molub	Alloy BRB-572
Optimol	Olista Longtime 2
Shell	Alvania EP2
Texaco	Multifak EP2
Total	Multis EP2
Tribol	Tribol 3030-2



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Address List

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	West	SEW-EURODRIVE GmbH & Co KG Siemensstraße 1 D-40764 Langenfeld (near Düsseldorf)	Tel. +49 2173 8507-30 Fax +49 2173 8507-55 sc-west@sew-eurodrive.de
	Drive Service Hotline / 24 Hour Service		+49 180 5 SEWHELP +49 180 5 7394357
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France			
Production Sales Service	Hagenau	SEW-USOCOME 48-54, route de Soufflenheim B. P. 20185 F-67506 Hagenau Cedex	Tel. +33 3 88 73 67 00 Fax +33 3 88 73 66 00 http://www.usocomme.com sew@usocomme.com
Assembly Sales Service	Bordeaux	SEW-USOCOME Parc d'activités de Magellan 62, avenue de Magellan - B. P. 182 F-33607 Pessac Cedex	Tel. +33 5 57 26 39 00 Fax +33 5 57 26 39 09
	Lyon	SEW-USOCOME Parc d'Affaires Roosevelt Rue Jacques Tati F-69120 Vaulx en Velin	Tel. +33 4 72 15 37 00 Fax +33 4 72 15 37 15
	Paris	SEW-USOCOME Zone industrielle 2, rue Denis Papin F-77390 Verneuil l'Etang	Tel. +33 1 64 42 40 80 Fax +33 1 64 42 40 88
Additional addresses for service in France provided on request!			
Algeria			
Sales	Alger	Réducom 16, rue des Frères Zaghoun Bellevue El-Harrach 16200 Alger	Tel. +213 21 8222-84 Fax +213 21 8222-84
Argentina			
Assembly Sales Service	Buenos Aires	SEW EURODRIVE ARGENTINA S.A. Centro Industrial Garin, Lote 35 Ruta Panamericana Km 37,5 1619 Garin	Tel. +54 3327 4572-84 Fax +54 3327 4572-21 sewar@sew-eurodrive.com.ar



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	Sydney	SEW-EURODRIVE PTY. LTD. 9, Sleigh Place, Wetherill Park New South Wales, 2164	Tel. +61 2 9725-9900 Fax +61 2 9725-9905 enquires@sew-eurodrive.com.au
	Townsville	SEW-EURODRIVE PTY. LTD. 12 Leyland Street Garbutt, QLD 4814	Tel. +61 7 4779 4333 Fax +61 7 4779 5333 enquires@sew-eurodrive.com.au
Austria			
Assembly Sales Service	Wien	SEW-EURODRIVE Ges.m.b.H. Richard-Strauss-Strasse 24 A-1230 Wien	Tel. +43 1 617 55 00-0 Fax +43 1 617 55 00-30 http://sew-eurodrive.at sew@sew-eurodrive.at
Belgium			
Assembly Sales Service	Brüssel	SEW Caron-Vector S.A. Avenue Eiffel 5 B-1300 Wavre	Tel. +32 10 231-311 Fax +32 10 231-336 http://www.caron-vector.be info@caron-vector.be
Brazil			
Production Sales Service	Sao Paulo	SEW-EURODRIVE Brasil Ltda. Avenida Amâncio Gaiolli, 50 Caixa Postal: 201-07111-970 Guarulhos/SP - Cep.: 07251-250	Tel. +55 11 6489-9133 Fax +55 11 6480-3328 http://www.sew.com.br sew@sew.com.br
	Additional addresses for service in Brazil provided on request!		
Bulgaria			
Sales	Sofia	BEVER-DRIVE GmbH Bogdanovetz Str.1 BG-1606 Sofia	Tel. +359 2 9151160 Fax +359 2 9151166 bever@fastbg.net
Cameroon			
Sales	Douala	Electro-Services Rue Drouot Akwa B.P. 2024 Douala	Tel. +237 4322-99 Fax +237 4277-03
Canada			
Assembly Sales Service	Toronto	SEW-EURODRIVE CO. OF CANADA LTD. 210 Walker Drive Bramalea, Ontario L6T3W1	Tel. +1 905 791-1553 Fax +1 905 791-2999 http://www.sew-eurodrive.ca l.reynolds@sew-eurodrive.ca
	Vancouver	SEW-EURODRIVE CO. OF CANADA LTD. 7188 Honeyman Street Delta, B.C. V4G 1 E2	Tel. +1 604 946-5535 Fax +1 604 946-2513 b.wake@sew-eurodrive.ca
	Montreal	SEW-EURODRIVE CO. OF CANADA LTD. 2555 Rue Leger Street LaSalle, Quebec H8N 2V9	Tel. +1 514 367-1124 Fax +1 514 367-3677 a.peluso@sew-eurodrive.ca
Additional addresses for service in Canada provided on request!			
Chile			
Assembly Sales Service	Santiago de Chile	SEW-EURODRIVE CHILE LTDA. Las Encinas 1295 Parque Industrial Valle Grande LAMP RCH-Santiago de Chile P.O. Box Casilla 23 Correo Quilicura - Santiago - Chile	Tel. +56 2 75770-00 Fax +56 2 75770-01 www.sew-eurodrive.cl ventas@sew-eurodrive.cl

China			
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Assembly Sales Service	Suzhou	SEW-EURODRIVE (Suzhou) Co., Ltd. 333, Suhong Middle Road Suzhou Industrial Park Jiangsu Province, 215021 P. R. China	Tel. +86 512 62581781 Fax +86 512 62581783 suzhou@sew.com.cn
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Colombia			
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Croatia			
Sales Service	Zagreb	KOMPEKS d. o. o. PIT Erdödy 4 II HR 10 000 Zagreb	Tel. +385 1 4613-158 Fax +385 1 4613-158 kompeks@net.hr
Czech Republic			
Sales	Praha	SEW-EURODRIVE CZ S.R.O. Business Centrum Praha Lužná 591 CZ-16000 Praha 6 - Vokovice	Tel. +420 220121234 Fax +420 220121237 http://www.sew-eurodrive.cz sew@sew-eurodrive.cz
Denmark			
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Estonia			
Sales	Tallin	ALAS-KUUL AS Mustamäe tee 24 EE-10620 Tallin	Tel. +372 6593230 Fax +372 6593231 veiko.soots@alas-kuul.ee
Finland			
Assembly Sales Service	Lahti	SEW-EURODRIVE OY Vesimäentie 4 FIN-15860 Hollola 2	Tel. +358 201 589-300 Fax +358 3 780-6211 sew@sew.fi http://www.sew-eurodrive.fi
Gabon			
Sales	Libreville	Electro-Services B.P. 1889 Libreville	Tel. +241 7340-11 Fax +241 7340-12
Great Britain			
Assembly Sales Service	Normanton	SEW-EURODRIVE Ltd. Beckbridge Industrial Estate P.O. Box No.1 GB-Normanton, West- Yorkshire WF6 1QR	Tel. +44 1924 893-855 Fax +44 1924 893-702 http://www.sew-eurodrive.co.uk info@sew-eurodrive.co.uk
Greece			
Sales Service	Athen	Christ. Boznos & Son S.A. 12, Mavromichali Street P.O. Box 80136, GR-18545 Piraeus	Tel. +30 2 1042 251-34 Fax +30 2 1042 251-59 http://www.boznos.gr info@boznos.gr



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Hungary			
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India			
Assembly Sales Service	Baroda	SEW-EURODRIVE India Pvt. Ltd. Plot No. 4, Gidc Por Ramangamdi • Baroda - 391 243 Gujarat	Tel. +91 265 2831086 Fax +91 265 2831087 http://www.seweurodriveindia.com mdoffice@seweurodriveindia.com
Technical Offices	Bangalore	SEW-EURODRIVE India Private Limited 308, Prestige Centre Point 7, Edward Road Bangalore	Tel. +91 80 22266565 Fax +91 80 22266569 salesbang@seweurodriveinindia.com
Ireland			
Sales Service	Dublin	Alpert Engineering Ltd. 48 Moyle Road Dublin Industrial Estate Glasnevin, Dublin 11	Tel. +353 1 830-6277 Fax +353 1 830-6458
Israel			
Sales	Tel-Aviv	Liraz Handasa Ltd. Ahofer Str 34B / 228 58858 Holon	Tel. +972 3 5599511 Fax +972 3 5599512 lirazhandasa@barak-online.net
Italy			
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Ivory Coast			
Sales	Abidjan	SICA Ste industrielle et commerciale pour l'Afrique 165, Bld de Marseille B.P. 2323, Abidjan 08	Tel. +225 2579-44 Fax +225 2584-36
Japan			
Assembly Sales Service	Iwata	SEW-EURODRIVE JAPAN CO., LTD 250-1, Shimoman-no, Iwata Shizuoka 438-0818	Tel. +81 538 373811 Fax +81 538 373814 sewjapan@sew-eurodrive.co.jp
Korea			
Assembly Sales Service	Ansan-City	SEW-EURODRIVE KOREA CO., LTD. B 601-4, Banweol Industrial Estate Unit 1048-4, Shingil-Dong Ansan 425-120	Tel. +82 31 492-8051 Fax +82 31 492-8056 http://www.sew-korea.co.kr master@sew-korea.co.kr
Latvia			
Sales	Riga	SIA Alas-Kuul Katlakalna 11C LV-1073 Riga	Tel. +371 7139253 Fax +371 7139386 http://www.alas-kuul.com info@alas-kuul.com

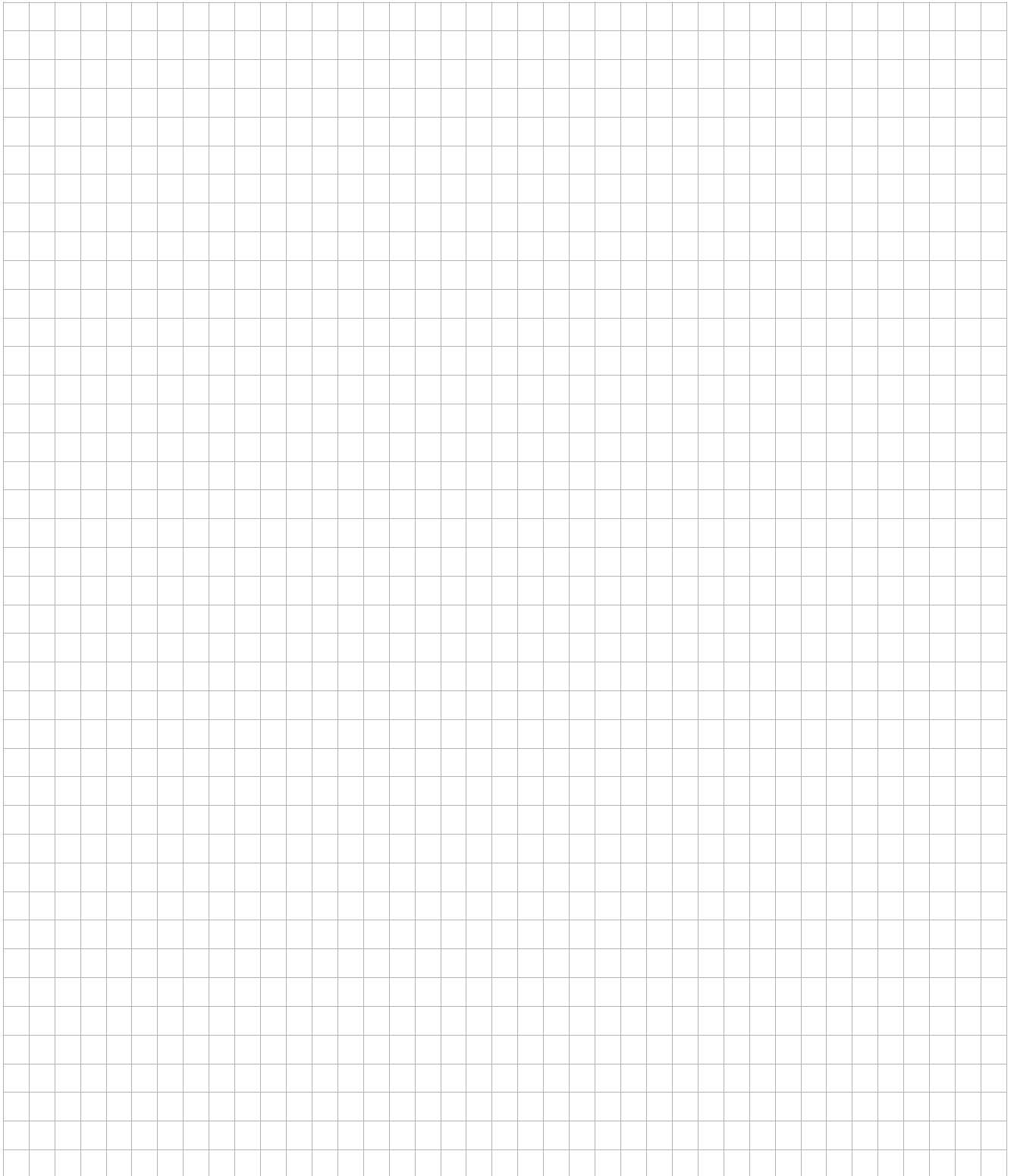
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Lithuania			
Sales	Alytus	UAB Irseva Naujoji 19 LT-62175 Alytus	Tel. +370 315 79204 Fax +370 315 56175 info@irseva.lt http://www.sew-eurodrive.lt
Luxembourg			
Assembly Sales Service	Brüssel	CARON-VECTOR S.A. Avenue Eiffel 5 B-1300 Wavre	Tel. +32 10 231-311 Fax +32 10 231-336 http://www.caron-vector.be info@caron-vector.be
Malaysia			
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Mexico			
Assembly Sales Service	Queretaro	SEW-EURODRIVE MEXIKO SA DE CV SEM-981118-M93 Tequisquiapan No. 102 Parque Industriail Queretaro C.P. 76220 Queretaro, Mexico	Tel. +52 442 1030-300 Fax +52 442 1030-301 http://www.sew-eurodrive.com.mx scmexico@seweurodrive.com.mx
Morocco			
Sales	Casablanca	Afit 5, rue Emir Abdelkader MA 20300 Casablanca	Tel. +212 22618372 Fax +212 22618351 richard.miekisiak@premium.net.ma
Netherlands			
Assembly Sales Service	Rotterdam	VECTOR Aandrijftechniek B.V. Industrieweg 175 NL-3044 AS Rotterdam Postbus 10085 NL-3004 AB Rotterdam	Tel. +31 10 4463-700 Fax +31 10 4155-552 http://www.vector.nu info@vector.nu
New Zealand			
Assembly Sales Service	Auckland	SEW-EURODRIVE NEW ZEALAND LTD. P.O. Box 58-428 82 Greenmount drive East Tamaki Auckland	Tel. +64 9 2745627 Fax +64 9 2740165 http://www.sew-eurodrive.co.nz sales@sew-eurodrive.co.nz
	Christchurch	SEW-EURODRIVE NEW ZEALAND LTD. 10 Settlers Crescent, Ferryroad Christchurch	Tel. +64 3 384-6251 Fax +64 3 384-6455 sales@sew-eurodrive.co.nz
Norway			
Assembly Sales Service	Moss	SEW-EURODRIVE A/S Solgaard skog 71 N-1599 Moss	Tel. +47 69 241-020 Fax +47 69 241-040 http://www.sew-eurodrive.no sew@sew-eurodrive.no
Peru			
Assembly Sales Service	Lima	SEW DEL PERU MOTORES REDUCTORES S.A.C. Los Calderos, 120-124 Urbanizacion Industrial Vulcano, ATE, Lima	Tel. +51 1 3495280 Fax +51 1 3493002 http://www.sew-eurodrive.com.pe sewperu@sew-eurodrive.com.pe

Poland			
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Portugal			
Assembly Sales Service	Coimbra	SEW-EURODRIVE, LDA. Apartado 15 P-3050-901 Mealhada	Tel. +351 231 20 9670 Fax +351 231 20 3685 http://www.sew-eurodrive.pt infosew@sew-eurodrive.pt
Romania			
Sales Service	Bucuresti	Sialco Trading SRL str. Madrid nr.4 011785 Bucuresti	Tel. +40 21 230-1328 Fax +40 21 230-7170 sialco@sialco.ro
Russia			
Assembly Sales Service	St. Petersburg	ZAO SEW-EURODRIVE P.O. Box 36 195220 St. Petersburg Russia	Tel. +7 812 3332522 +7 812 5357142 Fax +7 812 3332523 http://www.sew-eurodrive.ru sew@sew-eurodrive.ru
Senegal			
Sales	Dakar	SENEMECA Mécanique Générale Km 8, Route de Rufisque B.P. 3251, Dakar	Tel. +221 849 47-70 Fax +221 849 47-71 senemeca@sentoo.sn
Serbia and Montenegro			
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Singapore			
Assembly Sales Service	Singapore	SEW-EURODRIVE PTE. LTD. No 9, Tuas Drive 2 Jurong Industrial Estate Singapore 638644	Tel. +65 68621701 Fax +65 68612827 http://www.sew-eurodrive.com.sg sewsingapore@sew-eurodrive.com
Slovakia			
Sales	Bratislava	SEW-Eurodrive SK s.r.o. Rybnicna 40 SK-83107 Bratislava	Tel. +421 2 49595201 Fax +421 2 49595200 http://www.sew.sk sew@sew-eurodrive.sk
	Zilina	SEW-Eurodrive SK s.r.o. ul. Vojtecha Spanyola 33 SK-010 01 Zilina	Tel. +421 41 700 2513 Fax +421 41 700 2514 sew@sew-eurodrive.sk
	Banská Bystrica	SEW-Eurodrive SK s.r.o. Rudlovská cesta 85 SK-97411 Banská Bystrica	Tel. +421 48 414 6564 Fax +421 48 414 6566 sew@sew-eurodrive.sk
Slovenia			
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	Capetown	SEW-EURODRIVE (PROPRIETARY) LIMITED Rainbow Park Cnr. Racecourse & Omuramba Road Montague Gardens Cape Town P.O.Box 36556 Chempet 7442 Cape Town	Tel. +27 21 552-9820 Fax +27 21 552-9830 Telex 576 062 dswanepoel@sew.co.za
	Durban	SEW-EURODRIVE (PROPRIETARY) LIMITED 2 Monaceo Place Pinetown Durban P.O. Box 10433, Ashwood 3605	Tel. +27 31 700-3451 Fax +27 31 700-3847 dtait@sew.co.za
Spain			
Assembly Sales Service	Bilbao	SEW-EURODRIVE ESPAÑA, S.L. Parque Tecnológico, Edificio, 302 E-48170 Zamudio (Vizcaya)	Tel. +34 9 4431 84-70 Fax +34 9 4431 84-71 http://www.sew-eurodrive.es sew.spain@sew-eurodrive.es
Sweden			
Assembly Sales Service	Jönköping	SEW-EURODRIVE AB Gnejsvägen 6-8 S-55303 Jönköping Box 3100 S-55003 Jönköping	Tel. +46 36 3442-00 Fax +46 36 3442-80 http://www.sew-eurodrive.se info@sew-eurodrive.se
Switzerland			
Assembly Sales Service	Basel	Alfred Imhof A.G. Jurastrasse 10 CH-4142 Münchenstein bei Basel	Tel. +41 61 417 1717 Fax +41 61 417 1700 http://www.imhof-sew.ch info@imhof-sew.ch
Thailand			
Assembly Sales Service	Chon Buri	SEW-EURODRIVE (Thailand) Ltd. Bangpakong Industrial Park 2 700/456, Moo.7, Tambol Donhuaroh Muang District Chon Buri 20000	Tel. +66 38 454281 Fax +66 38 454288 sewthailand@sew-eurodrive.com
Tunisia			
Sales	Tunis	T. M.S. Technic Marketing Service 7, rue Ibn El Heithem Z.I. SMMT 2014 Mégrine Erriadh	Tel. +216 1 4340-64 + 1 4320-29 Fax +216 1 4329-76 tms@tms.com.tn
Turkey			
Assembly Sales Service	Istanbul	SEW-EURODRIVE Hareket Sistemleri San. ve Tic. Ltd. Sti. Bagdat Cad. Koruma Cikmazi No. 3 TR-34846 Maltepe ISTANBUL	Tel. +90 216 4419163 / 164 3838014/15 Fax +90 216 3055867 sew@sew-eurodrive.com.tr
Ukraine			
Sales Service	Dnepropetrovsk	SEW-EURODRIVE Str. Rabochaja 23-B, Office 409 49008 Dnepropetrovsk	Tel. +380 56 370 3211 Fax +380 56 372 2078 http://www.sew-eurodrive.ua sew@sew-eurodrive.ua



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	San Francisco	SEW-EURODRIVE INC. 30599 San Antonio St. Hayward, California 94544-7101	Tel. +1 510 487-3560 Fax +1 510 487-6381 cshayward@seweurodrive.com
	Philadelphia/PA	SEW-EURODRIVE INC. Pureland Ind. Complex 2107 High Hill Road, P.O. Box 481 Bridgeport, New Jersey 08014	Tel. +1 856 467-2277 Fax +1 856 845-3179 csbridgeport@seweurodrive.com
	Dayton	SEW-EURODRIVE INC. 2001 West Main Street Troy, Ohio 45373	Tel. +1 937 335-0036 Fax +1 937 440-3799 cstroy@seweurodrive.com
	Dallas	SEW-EURODRIVE INC. 3950 Platinum Way Dallas, Texas 75237	Tel. +1 214 330-4824 Fax +1 214 330-4724 csdallas@seweurodrive.com
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Venezuela			
Assembly Sales Service	Valencia	SEW-EURODRIVE Venezuela S.A. Av. Norte Sur No. 3, Galpon 84-319 Zona Industrial Municipal Norte Valencia, Estado Carabobo	Tel. +58 241 832-9804 Fax +58 241 838-6275 http://www.sew-eurodrive.com.ve sewventas@cantv.net sewfinanzas@cantv.net



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